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INTESTINAL TUBERCULOSIS *

F. L. JENNINGS, M.D., and E. FENGER, M.D.
Glen Lake Sanatorium
Oak Terrace, Minnesota

Some years ago Osler gave us this statement, "No disease illustrates more forcefully the slow but sure advance of science, nor the practical application of science for the betterment of mankind than does the study of the history of tuberculosis."[1] Another chapter has been added to that history. It is the chapter concerning intestinal tuberculosis. This complication, until a few years ago, was considered a fatal one, but during the last few years much has been learned about it, especially with regard to diagnosis and prognosis.

Intestinal tuberculosis may occur as a primary disease, but is much more frequently found as a secondary manifestation to pulmonary tuberculosis. We have found it complicating pulmonary tuberculosis in 33.23 per cent of our cases. Many of the 385 patients studied were studied because of symptoms referable to the intestinal tract and it is felt that 20 per cent represents the more exact proportion of our cases who have intestinal complications.

Pathology.—The site of predilection of intestinal tuberculosis is in the ileo-cecal area. With this as the starting point, the pathology may extend both ways, although the progress along the larger bowel is more usual than along the smaller bowel. Direct contact with swallowed bacilli perhaps best explains the origin of the ulceration, but hematogenous and lymphatic origin cannot be definitely ruled out.

Stengle divides this condition into three types: the ulcerative, hyperplastic and stenotic. The first two, alone or combined, were the types which we encountered, with the ulcerative the more common and the easier to diagnose.

Symptomatology.—Patients with intestinal tuberculosis present a variety of symptoms, all of which may be referable to the gastrointestinal tract. There are no specific symptoms or any combination of symptoms which are particularly characteristic of intestinal tuberculosis. This is not at all surprising when one considers that the lesion may be found in any part of the intestines or in scattered areas of the intestines; likewise, that the lesion may be found in any of the various stages of healing or ulceration. These symptoms are: nausea, vomiting, anorexia, pain, gas, abdominal distress, pyrosis, constipation, and diarrhea. Loss of weight, fever, and tachycardia are also frequently associated with intestinal tuberculosis. One or two of these symptoms deserve further consideration: abdominal distress, which is particularly common

Fig. 1. Barium meal: Six hours. Marked hypermotility, the barium appearing ragged in the sigmoid, cecum and ascending colon.

and is vaguely and variously described by different patients. This distress does not usually come on until an hour or two after eating, and remains until the next meal, being relieved by food. Pain, which is a late sign, is experienced by practically all of our people. As a rule, it is not localized and may shift from place to place. It not infrequently appears directly after meals and we find our patients

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abstaining from food rather than suffer the pain. Again, it may come on from one to two hours after eating and be relieved only by evacuation of the bowels. Pyrosis is experienced by many. Constipation and diarrhea were formerly considered grounds for the diagnosis of enterocolitis, especially if they alternated. We now know that these are late symptoms, with only severe diarrhea as a later one. Constipation is usually an early symptom, although it may supplant severe diarrhea at the last. Archibald[2] felt that diarrhea was indicative of ulceration of the large bowel, while constipation was evidence of disease of the small bowel. This, however, we have not been able to verify.

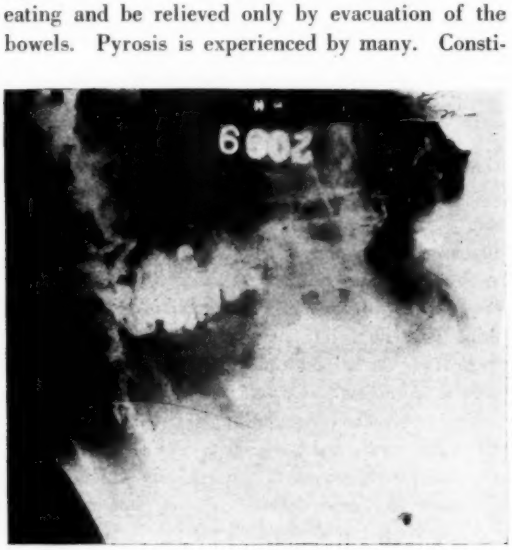

Fig. 2. Barium meal: Seven hours. Cecum and ascending colon more ragged than at six hours.

Diagnosis.—The pathological diagnosis and clinical diagnosis are quite at variance in intestinal tuberculosis as in many other diseases. The pathologists find from 56 to 92 per cent (majority 60 to 70 per cent) of people dying from tuberculosis with intestinal lesions. There are several reasons for this difference: (1) the pathologist deals with lethal tuberculosis; (2) extensive ulcerations of the mucosa are often found without any symptoms having been apparent during life; (3) radiographically, we are dealing with a hollow organ and are only seeing it in one plane. Then again, we are as yet only able to diagnose the disease when it is located in the large intestines and even though the cecum is the site of predilection, Schwaatt[3] found, in his pathological study of 199 cases, the large bowel involved alone in eighteen cases, the small bowel alone in thirty.

Physical examination gives us little or nothing in the most common type of disease, the ulcerative, unless it be tenderness. In the hypertrophic type, there may be a palpable mass over the cecum or other areas.

The sigmoidoscopic examination is of help in an occasional case, particularly where the ulcers are low down.

The finding of tubercle bacilli in the feces of patients who have no pulmonary tuberculosis, or from patients whose sputum shows no evidence of the germ, is of decided help. One should not rely wholly upon microscopical evidence but should resort to guinea pig inoculation in these cases.

The greatest reliance in making a diagnosis of intestinal tuberculosis, therefore, has to be placed on the *x*-ray examination, the following details of which have been followed in our hospital: The patient comes to the fluoroscopic room at 9 A. M. for his barium meal, having previously had no breakfast unless it be a bit of toast and coffee. At this time, the esophagus and stomach are carefully studied. We are careful that no cathartic is given for at least two days prior to this examination.

Fig. 3. Barium meal: Eight hours. Cecum, ascending colon and first part of the transverse colon very ragged.

Fluoroscopic observations and films are made again at the sixth, seventh, eighth, and possibly ninth hours. The motility is noted at all observations and particular attention is given to raggedness and filling defects if found in the same area

in all the observations. We feel that one is fairly safe in venturing a diagnosis of intestinal tuberculosis *if* the patient has pulmonary tuberculosis. Observation is also made at the twenty-fourth hour. The defects are most frequently seen at the cecum and ascending colon. (See illustrations.)

After the barium meal has been entirely expelled, a barium enema is given under low pressure and this in the cases with extensive ulceration usually corroborates what has already gone before, showing irregularity along the colon, especially in the cecum and ascending colon. The cecum does not fill out in the full round manner normally seen and one of our most common findings is a "spitting" of the barium analward from the cecum or ascending colon to the hepatic flexure, or mid-transverse colon. However, more reliance should be placed on the observations of the meal than upon those of the enema.

Prognosis.—In 1920 we studied a few of our patients in this manner, but in reviewing those cases now we find that their incompleteness makes it impossible to make any accurate diagnosis. One patient, however, so examined at that time and

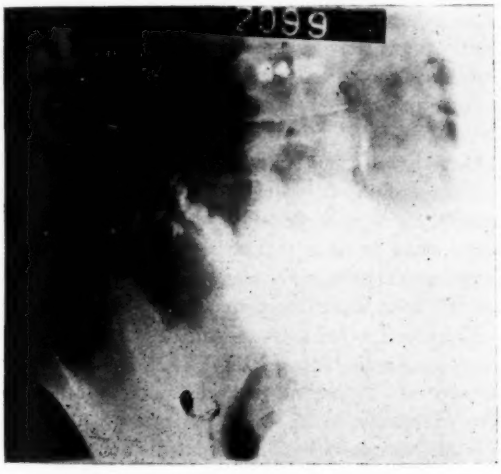

Fig. 4. Barium meal: Twenty-four hours. Cecum, ascending and transverse colon show only a faint trace of barium.

proved by operation for appendicitis the same year, is alive and has been working for the past three and a half years. Several of the patients diagnosed by us in 1922 are alive and many are working. Had we said ten years ago that there was a possibility of an individual with intestinal tuberculosis living three to five years, our judgment would have been severely questioned.

Treatment.—We have endeavored to treat our patients with open mind, feeling that intestinal

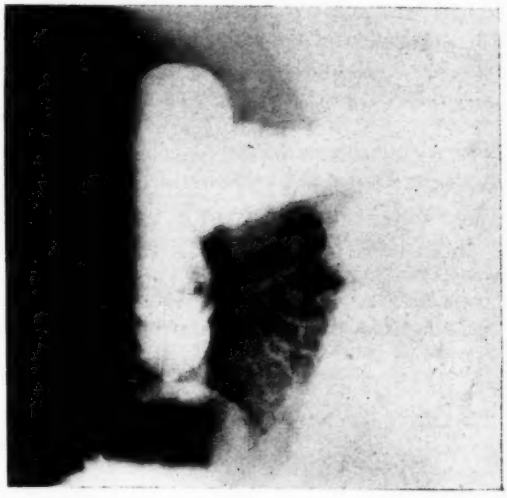

Fig. 5. Barium enema filled the colon with ease but encountered a filling defect at the cecum. Barium was immediately spat analward to the mid-transverse colon.

tuberculosis, like tuberculosis of other parts, is characterized by remissions and exacerbations and some of the apparently good results obtained by this or that treatment might be due simply to a remission of the disease. There, however, is a strong feeling among physicians throughout the country and among patients in our hospital that the Quartz Mercury Vapor lamp is almost a specific, and there are grounds for that belief. Take, for instance, six of our patients diagnosed early in March of this year, who were all treated similarly, that is, with local radiations over the abdomen. Four of these patients were symptom-free in fifteen days. The fifth one was symptom-free after six weeks and has remained so since. The sixth patient received no beneficial results, and it was finally necessary to discontinue the lamp and treat him by dietary methods. Objectively, however, the results were not as marked.

Another large group of our patients we have treated by dietary measures, beginning by two ounces of milk and two ounces of cream every hour and gradually increasing the amount and quality of food as in the Sippy diet, omitting, of course,

the powder. This milk and cream regime was followed until the patients were on a fairly liberal diet comparatively free from cellulose. The results in this group have been quite satisfactory, there being almost an immediate cessation of pain after the milk and cream were started.

A combination of the above treatment has been necessary in some cases.

Heliotherapy gives results comparable to actinotherapy.

Surgery is advocated by some but none of our patients have been thus treated.

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One day, going with George Ross through Bedlam, Dr. Savage, at that time the physician in charge, remarked upon two great groups of patients—those who were depressed in the morning and those who were cheerful; and he suggested that the spirits rose and fell with the bodily temperature—those with very low morning temperatures were depressed, and vice versa. This, I believe, expresses a truth which may explain the extraordinary difference in the habits of students in this matter of the time at which the best work can be done. Outside of the asylum there are also the two great types, the student-lark who loves to see the sun rise, who comes to breakfast with a cheerful morning face, never so "fit" as at 6 A. M. We all know the type. What a contrast to the student-owl with his saturnine morning face, thoroughly unhappy, cheated by the wretched breakfast-bell of the two best hours of the day for sleep; no appetite, and permeated with an unspeakable hostility to his vis-a-vis, whose morning garrulity and good humor are equally offensive. Only gradually, as the day wears on and his temperature rises, does he become endurable to himself and to others. But see him really awake at 10 P. M.! While the plethoric lark is in hopeless coma over his books, from which it is hard to rouse him sufficiently to get his boots off for bed, our lean owl-friend, Saturn no longer in the ascendant, with bright eyes and cheery face, is ready for four hours of anything you wish—deep study, or "Heart affluence in discursive talk," and by 2 A. M. he will undertake to unsphere the spirit of Plato. In neither a virtue, in neither a fault; we must recognize these two types of students, differently constituted owing possibly—though I have but little evidence for the belief—to thermal peculiarities.—"*The Student Life*" in "*Aequanimitas*"—William Osler.

INDICATIONS FOR ARTIFICIAL PNEUMOTHORAX *

P. M. MATTILL, M.D.
M. H. WALL, M.D.
Oak Terrace, Minnesota

The indications for pneumothorax are twofold: those that concern the diseased lung itself, and those that concern the contralateral lung together with tuberculous or non-tuberculous pathological conditions in other parts of the body.

Those concerning the more diseased lung have to do with the extent and type of involvement and the presence of hemorrhage. Early or incipient cases are not considered among those which should have pneumothorax. Reports have appeared in the literature on the use of pneumothorax in early cases, but they are not convincing. Collapsing the lung does not cure the patient's tuberculosis, but merely places the lung at rest and allows healing to proceed more rapidly. It does not, therefore, obviate a period of rest treatment. With a false sense of security from the pneumothorax treatment, the importance of taking the proper amount of rest is with difficulty impressed upon the patient. Some may say that in our cases the treatment was not started early enough, but since such a large number of pulmonary cases recover without the use of pneumothorax, we feel that the usual conservative treatment should first be given a trial.

The duration of pneumothorax treatment must be considered in years rather than in months, and this factor must be taken into account in starting treatment in relatively early and even in the more advanced cases where the patient is doing well.

There are certain complications which accompany pneumothorax, and these also must be taken into account in instituting treatment. Fluid occurs very frequently, in 50 to 100 per cent of all cases, depending on how long the treatment is continued. Other less frequent complications are empyema, subcutaneous emphysema, spontaneous pneumothorax and air embolism. Any one of these complications may influence the course of the disease unfavorably. Hemorrhage may be an indication in early involvement but these cases are exceptional. The indications for inducing pneumothorax in our series are given in Table 1. Extensive involvement

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with or without cavity leads the list, while its use for the control of hemorrhage is one of the least frequent indications. Large cavities are in themselves indications of treatment if there are no contraindications. Extension of the disease is likewise an indication. It has been observed here that the results of compression are not as good in acutely diseased lungs as in the more chronic types.

Any one of the above conditions may be present and still pneumothorax be impossible because of involvement in the contralateral lung. A case requires careful study before treatment is started to determine whether there is any trouble in the contralateral lung. Ideally the opposite lung should be entirely clear both by *x*-ray and physical signs. As is seen by Table 2 the contralateral lung has been clear in 27 per cent of our cases while in the group under treatment at the present time it is entirely clear in 43.5 per cent, indicating a more careful selection of cases. In determining the condition of the contralateral lung the *x*-ray is absolutely essential. Many cases which have no definite physical signs show the presence of infiltration.

TABLE I

Indications for Collapsing Lung—	No.	Per Cent
Extensive involvement (with or without cavity)	61	41
Extension of disease	26	17
No improvement	24	16
Treatment began before entrance	17	11
Hemorrhage	15	10
Air to replace fluid	7	5
Total	150	

Our experience has been that unless there is evidence of definite fibrosis, the danger of the lesion becoming activated by pneumothorax is very real. The opinion of our roentgenologist is obtained in all cases. There are a few exceptional cases in which the physical signs tend to clear up with the collapse of the more extensively diseased lung. In general it may be said that signs of activity in the good lung on physical examination, or a recent parenchymal lesion as seen by *x*-ray but without physical signs, is a contraindication for collapsing the more extensively involved lung. In a limited number of cases bilateral pneumothorax has definite value. Better results are seen in those cases in which a unilateral collapse has been established for some time and in which the collapse is only partial because of adhesions. In such a case, if extension occurs in the relatively good lung, bilateral pneumothorax may be considered. In the presence of complete collapse of one lung, bilateral pneumothorax is dangerous because by spontaneous or accidental means the complete collapse may occur in the other lung also. Bilateral pneumothorax has been done in twelve cases in our series and in three of these directly for the control of hemorrhage. In six of the twelve cases, very definite benefits have been noted.

Tuberculous complications are in themselves no longer considered a contraindication to artificial pneumothorax. They may, however, indicate such widespread disease that pneumothorax will be of no benefit. A tuberculous enteritis, formerly considered as a contraindication, should be better able to respond to treatment with the diseased area in the lung placed at rest.

Since pneumothorax may throw an extra burden on the heart, any diseased condition of the heart, blood vessels, or kidneys may in general be considered a contraindication to pneumothorax.

TABLE II

Contralateral Lung (*X*-ray)—	No.	Per Cent
Entirely clear	41	27
Fibroid tuberculosis	59	39
Fibroid parenchymal	42	28
Calcified tuberculosis	5	3
Peribronchial	3	2
Total	150	

CONCLUSIONS

1. Pneumothorax should not be considered in early cases except for certain special indications.
2. The length of time necessary for treatment and the complications which are apt to occur are the main arguments against pneumothorax in early cases.
3. The results of compression are not as good in acutely involved lungs as in the more chronic type.
4. Recent infiltration in the contralateral lung determined either by physical signs or *x*-ray is a contraindication to artificial pneumothorax.
5. Bilateral pneumothorax is of value in a few carefully selected cases.
6. Tuberculous complications in other parts of the body are not as a rule contraindications to pneumothorax.
7. Disease of the heart, vessels, or kidneys may be a contraindication to pneumothorax.

DIFFERENTIAL DIAGNOSIS OF PULMONARY TUBERCULOSIS *

H. S. BOQUIST, M.D.
Oak Terrace, Minnesota

In the accompanying chart (Fig. 1) are presented the essential points in the differential diagnosis between lobar pneumonia, bronchopneumonia, bronchiectasis, asthma and tuberculosis. It is not my intention to discuss the differential diagnosis in detail, but rather to point out how tuberculosis may simulate any one of them.

Tuberculosis may at times appear very much like lobar pneumonia. Osler reports the case of a cab driver, who, after a night of exposure, was taken with a sudden chill. He was brought to the University Hospital at Philadelphia and five days later was made the object of a student clinic. Osler says that at that time there was wanting nothing in onset, symptoms, findings, etc., to make it a typical case of lobar pneumonia. It was not until ten days later that the tubercle bacillus was discovered in the sputum and the true nature of the case revealed.

Disease	Onset	Symptoms	Findings	Excretions	Blood
Lobar Pneumonia	Sudden chill Rigor	High fever — more or less constant Rapid Respiration Rapid Pulse Dry cough Thoracic pain	Aspect anxious Cyanosis Herpes Chest — Distant breath, fine crepitations replaced by dullness and tubular breathing Later conson. rales.	Sputum — rusty, transparent, homogeneous, extremely tenacious. Urine — Reduced high Specific gravity Trace of Albumen Absence of Chlorides	Leucocytosis 15,000 to 30,000
Broncho-Pneumonia	Primary in infancy onset like Lobar Secondary to some infectious disease Onset gradual	Fever is variable Pulse and respiration increased Cough dry and hard Thoracic pain is usually absent	At onset there may be no abnormal findings Dullness at base with rales Cyanosis	Sputum — thin mucus, mucopurulent. Occasional blood streaks	Leucocytosis less marked
Bronchiectasis	Gradual — From a variety of causes, pneumonia, dust, etc.	Paroxysms of cough Loss of strength Periods of Fever Night-sweats	Chest — varies — usually dull at base with moist crepitant rales Clubbing of fingers	Sputum — very large amounts, 3 II in 24 hours Fetid odor	Nothing characteristic
Asthma	Gradual	Paroxysms of Dyspnoea Cough Expectoration No Fever	Chest — Percussion note is normal or hyperresonant Auscultation gives whistling rales and rhonchi	Sputum — greyish pellets Thin at times Blood-streaked at times Curschmann spirals	Eosinophilia
Tuberculosis	Onset varies May resemble anything Often gradual	Loss of strength Loss of endurance Loss of weight Fever High pulse Night-sweats Cough	Usually some impairment of resonance at apices Increased breath-sounds Fine rales There may be no findings	Sputum — which elastic fibers Tubercle bacillus	Nothing characteristic Leucocytosis of about 12,000 common

Fig. 1.

In our own experience at the sanatorium, we have found instances where relapses of tuberculosis simulate lobar pneumonia. One of our patients developed a lobar pneumonia with a typical febrile course which terminated fatally. At autopsy there were no signs of tuberculosis. Another patient entered the sanatorium with a moderate amount of tuberculous involvement in the right apex and a slight amount in the left. Her prognosis seemed favorable and the summer of 1924 found her an ambulant patient and doing very well. On August 29th, she was taken sick suddenly with a chill and in a day or two her temperature rose and maintained a level much like that of lobar pneumonia. At this time the findings were dullness at the right base posteriorly, with showers of fine crepitant râles at the end of inspiration. Lobar pneumonia was suspected, but as time went on, it became apparent that we were dealing with a massive tuberculous infiltration. Figure 2 shows the roentgenogram of our case before the acute exacerbation, and Figure 3, the picture after the exacerbation.

Tuberculosis is often diagnosed as bronchopneumonia. Of the 540 adults present in the hospital at the date of this paper, fifty-nine gave a

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history of having had some form of pneumonia from two to three years before the diagnosis of tuberculosis was made, with the further history of never having completely recovered from this pneumonia. Five more patients gave the same history, except that the date of the pneumonia extended back three to five years. Six more patients gave a history of having had a diagnosis of tuberculosis which later was reversed by another doctor, who called it pneumonia. Time, however, proved that the first diagnosis was correct. Bronchopneumonia, except in infancy, is generally secondary to some infectious disease. Tuberculosis should always be suspected, and if the findings are at the apices, the doctor should consider it tuberculosis unless proven otherwise.

Bronchiectasis is a dilatation of the small bronchi of the lung. We find it in a variety of diseases or following a variety of causes. Once established, it seems to constitute a clinical entity, even after the original cause has been removed. It is very easy to confuse bronchiectasis and tuberculosis. The outstanding symptoms are paroxysms of cough, loss of strength, loss of weight, periods of fever, night sweats. These will easily bring tuberculosis to mind. In fact, the error here is usually on the other side; that is, a diagnosis of tuberculosis is

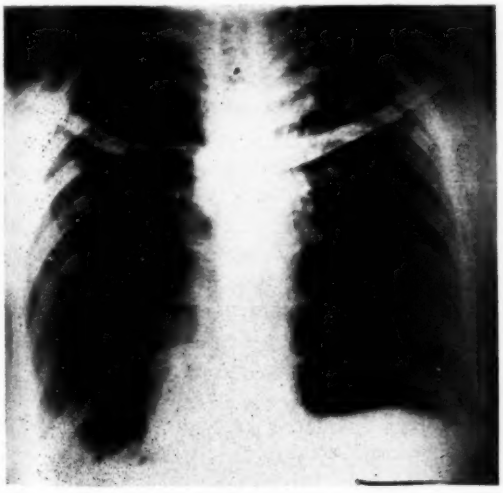

Fig. 2.

more often made in a case of bronchiectasis than a diagnosis of bronchiectasis in a case of tuberculosis. In about three years there have been discharged from the Glen Lake Sanatorium some thirty cases of bronchiectasis. They have entered with a diagnosis of tuberculosis. After a prolonged study consisting of repeated physical examinations, several *x*-ray plates, inoculation of sputum in guinea

Fig. 3.

pigs and of diagnostic courses of tuberculin, they have been found to be non-tuberculous.

The old idea of bronchial asthma in relationship to tuberculosis was that the two were never coexistent. The incidence of asthma in tuberculosis is perhaps not very great. However, Dr. J. J. Mendelsohn, physician in charge of the Stock Yards Dispensary, in Chicago, states that every asthmatic should be considered a potential case of pulmonary tuberculosis. Sputum should be examined frequently for the presence of tubercle bacilli. We have at the sanatorium at present about six cases of asthma out of a total number of 540 adult patients. One of these patients had asthma fifteen years before tuberculosis was diagnosed. Another had asthma seven years previous to the tuberculosis. Two of the patients seemed to have developed asthmatic symptoms after their onset of tuberculosis. During the last three years we have discharged four patients with a diagnosis of asthma who were admitted with a diagnosis of tuberculosis. One of these gave a history of slight elevation of afternoon temperature for several months. Physical examination and *x*-ray failed to reveal tuberculosis. Careful search for focal infection was made and abscessed teeth were found. Removal of the abscessed teeth brought on a cessation

of afternoon temperature. The patient was then put through a diagnostic course of tuberculin with negative results. She was finally discharged as non-tuberculous and during the eight months that she has been out of the institution has been doing very well.

Many cases need very careful study before a diagnosis of tuberculosis can be made or before it can be ruled out. The onset varies. Dr. Harold E. Robertson, speaking from the standpoint of pathology, once said, "Tuberculosis may resemble anything under the sun." That statement also holds true clinically. The symptoms are listed as loss of strength, loss of endurance, loss of weight, fever, high pulse, night sweats, cough, expectoration, hemorrhages, etc. The findings usually are impairment of resonance at the apices, increase in transmission of breath and voice sounds and fine râles after coughing; but there may be absolutely no physical findings and the symptoms may be very slight. Sputum may be absent or if present contain no tubercle bacilli. When we find such a case, it certainly taxes our utmost resources in arriving at a definite conclusion. Frequent examinations, repeated stereoscopic chest plates, inoculation of guinea pig with the sputum and a diagnostic course of tuberculin are all usually necessary. It sometimes requires several weeks of careful observation to determine the diagnosis. In view of the importance of a correct diagnosis to the patient, nothing should be left undone which might help to establish definitely the presence or absence of tuberculosis. There is a danger of depending too much on *x*-ray. Cabot says that, "as often as not, your *x*-ray leads you astray when it comes to diagnosis of incipient tuberculosis." In respect to the diagnostic course of tuberculin, we feel that a systemic reaction from less than 10 mg. of Koch's old tuberculin is of some significance. In a few instances where this has occurred, we have found, by gastro-intestinal study, involvement of the cecum where we have been unable to find any tuberculosis in the chest.

To recapitulate, tuberculosis may resemble a great variety of diseases, and it may give very slight evidence of its presence. The possibility of tuberculosis should always be borne in mind. Neither should a positive diagnosis be made nor should tuberculosis be excluded until a careful, painstaking study of the case has been made.

HELIOTHERAPY IN TUBERCULOSIS*

J. HARRY BENDES, M.D.
Oak Terrace, Minn.

Heliotherapy, as a conservative method for treating tuberculosis as promulgated by Rollier, has held the spotlight of public opinion for nearly twenty-five years. Some of his theories regarding heliotherapy have been disputed, especially the one regarding the rheostatic function of the tanned skin in converting the short ultra-violet rays into long ones. Whatever individual contentions may be regarding the action of the skin, or the physiology of light, we cannot fail to recognize the fact that heliotherapy is probably one of the greatest beneficial agents ever advocated or used in the treatment of all forms of tuberculosis.

Primarily, insolation was intended as a remedy for treating bone and joint tuberculosis, but as these conditions were usually associated with other types of the disease and they likewise responded, its usefulness was extended to embrace tuberculosis in all its forms. Today, heliotherapy is a remedy to be used in all types of tuberculosis and its efficiency lies not in the type of tuberculosis, but in its method of use. There are certain definite limitations to its use, and the idea of using it as a panacea in treatment is apt to make its use empirical.

If you should ask the various heliotherapists what the indications are for giving heliotherapy in tuberculosis, undoubtedly the reasons given would not be very tangible. In giving heliotherapy, there should be some definite indications, some concrete principles, by which each one could say that he is getting heliotherapy for a particular reason, and not for the blanket reason that it is good for surgical tuberculosis.

The first question put to me by the medical student is: "What are the indications for heliotherapy?"

Instead of classifying the indications for heliotherapy, I would rather classify the contraindications and they are:

1. Moribund patients.
2. Patients who do not respond favorably to the treatment.
3. Individuals with unstable nervous systems.

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There is no way of determining the type of case to select for heliotherapy, because no one can tell which will respond favorably and which unfavorably. From my experience, the unfavorable case (except the moribund case) is the one which does not react favorably while undergoing sun cure. One individual with slight pulmonary tuberculosis and a laryngeal involvement may run a rapid fatal course and finally succumb to the disease in spite of heliotherapy, while another with massive infection and laryngeal involvement become quiescent and even arrested. Some have a violent reaction to sun, while others are able to take long hours of sun cure without any reaction whatsoever.

I do not advocate giving all far advanced cases of pulmonary tuberculosis heliotherapy, but I do, in selected cases, advocate giving it a trial. In this institution, where nearly all of our surgical cases have a far advanced pulmonary lesion and some have cavity formation, no special attention is paid to the pulmonary involvement and the symptoms attributed to the lung, such as cough, expectoration, and the symptoms of toxemia all clear up.

Occasionally a patient has a hemorrhage. He is immediately taken off sun treatment and after a period of time put back on again.

During the years from its inception in 1903, by Rollier, to 1916, it was known that there was a place in Switzerland where tuberculosis was being treated by heliotherapy. In 1916, a symposium by Hyde and LoGrasso stimulated this work in America until today a sanatorium treating tuberculosis, especially extra-pulmonary tuberculosis, without heliotherapy is as passé as one not utilizing pneumothorax and thoracoplasty in the treatment of the disease.

In the treatment of extra-pulmonary tuberculosis it must be remembered that it is not the bone or joint alone that is sick, but the individual himself, and the bone or joint disease is merely a localization of a general constitutional disease. So in the treatment, the idea uppermost in our minds is that we are treating an individual who has tuberculosis.

The majority of extra-pulmonary cases of tuberculosis which come to the sanatorium for treatment are not picked cases or early cases, but rather the advanced cases who have had the usual modes of treatment and are transferred from other hospitals where they had the best medical and surgical care obtainable, but because of the ward arrangement or hospital construction, it was impossible to give sun cure. These individuals do or did not get well. They gradually, but surely, declined. Upon admittance to the sanatorium, the only additional treatment was heliotherapy, properly supervised, and the opposite results began to take place. Instead of a gradual decline, steady and rapid improvement began to take place. When the above is taken into consideration and properly weighed, it certainly is reasonable to assume that the thing which was lacking in the first treatment was the element of sunlight.

Giving heliotherapy does not mean merely turning a patient out into the sun; it means the proper and systematic exposure, step by step, each step watched and guarded. In bone and joint cases, orthopedic sense is applied to heliotherapy. When we consider that heliotherapy has a similar effect upon the individual as exercise, it behooves us to be careful in administering the treatment.

How the beneficial effect of the sun is obtained and what it is due to has been widely discussed and there is a divergency of opinion regarding it. We know that the beneficial effect obtained is in direct proportion to the individual's ability to produce a tan, and in such patients as the high-typed blondes, the red-haired individuals who would not tan, various methods were used to aid in the tanning, such as a diet of green vegetables rich in vitamines, drugs such as resorcinal, eosin and cod liver oil, to aid in the process.

The fact that some individuals tan and others do not, and that those individuals with a tanned skin get well, while those who do not tan are slow in making headway, makes me believe that the tanning of the skin acts as something other than a rheostat for the conversion of short ulta-violet rays into long ones. I know that the majority of you will not agree with me when I state that I believe that in dealing with the skin we are probably dealing with a ductless gland and the skin has some function similar to the organs of internal secretion, and the ability to tan depends upon the sun's ability to stimulate this gland.

A patient enters the sanatorium and after a period of observation he takes the initial sunbath, and as insolation goes on, his color changes from a sickly pale color to a slight erythema, then a brown color and finally a deep mahogany brown. Along with this, going hand in hand, is the drop in temperature, the slowing of the pulse, cessation

of pain, restful sleep, increased appetite, gain in weight, and instead of being a morose, unhappy individual, he becomes a contented, robust individual with a bright outlook upon life.

It was supposed that in order to obtain good results in sun cure, high altitudes were necessary. True, high altitudes are desired, but not always obtainable, and there are many advantages to be had, such as purer air, air free from dust and smoke, and the higher the altitude, the more ultra-violet rays. But good results can be obtained in low altitudes, especially if heliotherapy is practiced early in the day, in spite of the slanting rays of the sun. Then the therapeutic efficacy of the sun is at its highest point. In the early morning the air is free from dust and smoke. Ultra-violet radiation from the sun is supported by the ultra-violet radiation from the sky, and principally the harmful effect from the heat rays are not there. It is not the quantity of sun exposure that the patient needs, but the quality of the exposure.

The Commonwealth Fund, a philanthropic foundation with offices at 1 East 57th Street, announces an initial appropriation of $350,000 to be expended for the construction of two hospitals in rural communities. This appropriation marks the beginning by the Fund of a new project which will involve the building of two such hospitals a year.

Farmville, Virginia, has been selected from among more than fifty applications as the location of the first of these hospitals, following a special study by Henry C. Wright, hospital consultant and former deputy commissioner of the New York City Department of Public Welfare. James Gamble Rogers and Henry C. Pelton, Associated, are preparing plans for this first unit.

On March first the Fund will establish a Division of Rural Hospitals under the direction of Mr. H. J. Southmayd, at present hospital consultant to the Cleveland Welfare Federation. The Department plans to receive applications from rural communities under certain conditions, chief of which is that the Fund will in the case of approved applications contribute two-thirds of the cost of construction and equipment of the hospital, while the local community must contribute one-third. The community must also meet operating and maintenance costs.

The Commonwealth Fund, established in 1918 by Mrs. Stephen V. Harkness and chartered to carry on work "for the benefit of mankind," has just announced additional gifts from Mrs. Harkness which increase its total endowment to $38,000,000. The annual income, amounting last year to $1,339,000, is expended for a variety of educational, scientific, and humanitarian activities. The Fund has devoted special attention to child welfare work and its demonstration programs for the prevention of juvenile delinquency and for the promotion of child health have until now received the major share of its annual appropriations.

PLEURISY: ITS SIGNIFICANCE AND TREATMENT *

D. R. HASTINGS, M.D.
Glen Lake Sanatorium
Oak Terrace, Minnesota

Although pleurisy may seem to be an old topic, it is an important one, inasmuch as we find that in the majority of cases it is one of the earliest symptoms of pulmonary tuberculosis.

Lawrason Brown, in his article on "Pleurisy with Effusion," states, "This can of course be due to other causes than tuberculosis, but the burden of proof should rest on him who says it is due to other causes."

With reference to the diagnosis of pleurisy, I wish to mention but a few of the most important symptoms and signs. Except in the most typical cases, the diagnosis is difficult. In one series of cases the investigator reports that at autopsy 74.4 per cent of the cases were found to have pleurisy, while the clinician in the same series had diagnosed only 2.7 per cent.

In fibrinous pleurisy, pain is often the first symptom noticed by the patient. Other symptoms and signs that follow are the sharp and shallow respiration, cough and friction rub. The friction rub often is difficult to find. With an effusion the symptoms and signs are different. The pain disappears, a tight feeling over the chest often appears. Dyspnea is a common symptom. Abdominal pain, tenderness and rigidity often occur. In many cases pleurisy is confused with acute abdominal conditions such as an acute appendicitis.

Intercostal neuralgia or pleurodynia, herpes zoster, and angina pectoris are the most troublesome in making a differential diagnosis. I will not attempt to give the differential diagnostic points. They are in any text book.

Now, after the diagnosis is made of either fibrinous pleurisy or pleurisy with an effusion, the etiology must be determined. Although pleurisy occurs with pneumonia, typhoid fever, nephritis, heart trouble, pyogenic infection, and with new growths, pulmonary tuberculosis is the most frequent cause. Dr. Robert C. Paterson said, "So frequently is this the etiological fact that it is a

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*Read before the Hennepin County Medical Society, at the Glen Lake Sanatorium, Oak Terrace, Minn., June 8, 1925.

safe rule to call every pleurisy tuberculous unless there is other definite cause."

In going over the charts of 1,182 cases admitted to the Glen Lake Sanatorium from January, 1916, to March, 1925, I have collected a few facts of interest in this connection. Forty-two charts of the 1,182 mentioned nothing concerning pleurisy. Therefore, we have for consideration 1,140 cases, the results of which are as shown in Table I.

TABLE I

REPORT OF PLEURISY AS FOUND IN 1,140 CASES

Type of Cases—	Number	Percentage
No history of pleurisy	505	44.3
Fibrinous pleurisy	580	50.8
Pleurisy with effusion	55	4.9
Fibrinous pleurisy and pleurisy with effusion combined	635	55.7

With reference to the cases with fibrinous pleurisy and pleurisy with effusion, there were 635 cases. Of the charts studied, 225 gave no definite date of the pleurisy. Therefore, for our consideration there were 410 cases. Table No. II shows these data:

TABLE II

THE TIME ELAPSING BETWEEN THE HISTORY OF PLEURISY AND THE DIAGNOSIS OF TUBERCULOSIS

Time Period—	No. of Cases	Percentage
5 years or more	53	12.9
4 to 5 years	12	2.9
3 to 4 years	29	7.0
2 to 3 years	30	7.4
1 month to 1 year	286	69.8

The treatment from the standpoint of the patient is the most important. In fibrinous pleurisy, where no definite cause can be found, the patient should be warned of the fact that he probably has tuberculosis. The patient's life should be regulated. He should be made to understand that the pleurisy has a much greater significance than just the few days' sickness. Periodic examinations should be advised, and at each examination all means and methods of obtaining a cause of the pleurisy put into effect. Then, by these methods, the patient cannot ask as they frequently do, "Why was I not warned before?"

Now, taking up the second type of pleurisy—pleurisy with effusion. The one main factor to keep in mind here is that it is not primary and if no other cause can be definitely pointed out as the cause, it is due to tuberculosis. If we keep this in mind, then a rational treatment can be easily advised; that is, treat every case of pleurisy with effusion as you would a case of pulmonary tuberculosis.

The question arises as to how the effusion is to be treated. Dr. Robert C. Paterson has proven that an effusion is an immunity process. Therefore, the effusion is not harmful. It should not be aspirated unless there is a definite indication.

Five points to be considered as indications for removal are:

1. Specimen for laboratory examination.
2. Pressure symptoms.
3. Mediastinal dislocation.
4. Failure to absorb.
5. Bilateral location.

One outstanding contraindication for the removal of the fluid is that in patients where the fluid has been removed empyema is common, while in cases where the fluid has been left to absorb, pus rarely forms.

Many cases begin to improve after an effusion develops. Why this is, it is hard to explain. Perhaps it is due to the fluid immobilizing the lung and giving it a partial rest.

SUMMARY

1. Case histories of 1,182 patients admitted to the Glen Lake Sanatorium were studied.
2. A history of fibrinous pleurisy and pleurisy with effusion occurred in 55.7 per cent of cases.
3. Fibrinous pleurisy may be the first symptom of pulmonary tuberculosis.
4. Patients with fibrinous pleurisy should be warned that they may have tuberculosis.
5. Pleurisy with effusion should be considered a sign of pulmonary tuberculosis unless it can be proven due to something else.
6. Patients with pleurisy with effusion should be treated as cases with pulmonary tuberculosis until other causative factor can be proven.

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GLEN LAKE SANATORIUM—ITS GROWTH AND DEVELOPMENT*

E. S. MARIETTE, M.D.
Oak Terrace, Minnesota

Glen Lake Sanatorium is one of the fourteen county sanatoria located in various parts of the state of Minnesota. These are all operating under the 1913 Minnesota Sanatorium law which provides the following:

1. A state supervising body known as the Advisory Commission. The Interim Bill passed by the last legislature abolished this commission and turned its functions over to the State Board of Control, so after July 1, 1925, the State supervision will be carried on by the State Board of Control.

2. State Aid both for construction and maintenance. The state agrees to match the county, dollar for dollar, to the extent of fifty thousand dollars for construction and further to pay the county five dollars per week for each free case.

3. A local Sanatorium Commission of three appointed by the Board of County Commissioners to have complete charge of the Sanatorium. One member of this Commission shall be a physician who shall be approved by the State Board of Health. The original Sanatorium Commission consisting of Mr. Edward C. Gale, Mr. Joseph R. Kingman and Dr. John W. Bell was appointed in 1913 by the Board of County Commissioners and has been reappointed from time to time with the exception of Dr. Bell, who resigned in 1919 because of ill health, Dr. S. Marx White being appointed in his place. This continuation of the same Board members had secured a uniform and progressive development of the Sanatorium during its period of growth.

4. That any resident of the county in any stage of tuberculosis shall be eligible for care in the Sanatorium but that preference shall always be given to patients in the most advanced stages of the disease. This means that preference must be given to the advanced case, no matter when the application is received; and that the early and favorable moderately advanced cases can be admitted only after all of the far-advanced and unfavorable moderately advanced cases have been taken care of. The reason for this is, that the State Sanatorium is planned for the early and favorable moderately advanced cases, and the county sanatoria are planned to take care of those cases who are physically unable to go to the State Sanatorium. It was felt that such a plan would round out the tuberculosis campaign and give care to all types of cases.

5. That some rate should be charged those patients who were financially able to pay but that no patient should be denied treatment because of his financial condition. The rate was left to the County Sanatorium Commission, and the Hennepin County Sanatorium Commission has fixed a maximum rate of twenty-one dollars per week and a minimum rate of two dollars per week with the further proviso that anyone who is unable to pay even that amount shall be admitted for treatment without charge.

6. That no limit should be placed upon the length of time anyone could receive treatment at any of the county sanatoria.

Acting under the authority conferred upon them by this law, the Sanatorium Commission began plans for a sanatorium which was finally located at Glen Lake. The original plans called for a cottage type of institution with an ultimate maximum capacity of about two hundred. The first unit, consisting of an administration building, a separate heating plant and one cottage, in all caring for about fifty patients, was ready for occupancy in January, 1916.

The institution proved popular, it was soon filled, and a waiting list was created and, contrary to the usual custom, patients were apparently eager to enter the Sanatorium. The Commission has made every effort to meet the demands of the community and has increased the capacity from time to time in an attempt to care for the waiting list, even though at one time there were as many as two hundred people who had made application to the Sanatorium and for whom there was no room. The growth has been steady and thus in about nine years'

*Read before the Hennepin County Medical Society at Glen Lake Sanatorium, Oak Terrace, Minn., June 8, 1925.

time we find a small meagerly equipped cottage type of sanatorium of fifty beds enlarged into a complete hospital-cottage type of sanatorium of over six hundred beds ready to care for tuberculosis in any stage and to cope with practically any complication which may arise. This unit includes adequate accommodations for nurses and employees; three residences; a large well-equipped central kitchen; adequate dining hall facilities for ambulant patients, doctors, nurses and employees; an auditorium, so located that it can be used by both the ambulant and bed patients (rather an unusual feature, as usually the auditorium is in a detached building and can only be used by the up-and-about patients); a social service department; an occupational therapy department; a separate children's unit of sixty beds; two cottages for ambulant patients; an infirmary unit of over four hundred and fifty beds, so constructed that it can be used either for the bed-ridden or ambulant patients as needed. This latter unit is completely equipped for the diagnosis and treatment of tuberculosis in any form and contains a modern laboratory, a complete *x*-ray department, two operating rooms, a dental suite for two full-time dentists, and heliotherapy quarters for about seventy cases of extra-pulmonary tuberculosis, the first unit of which was opened in 1921. Last but not least, the Sanatorium has a complete radio installation which provides a separate unit for the children's building with loud speakers for each ward, a receiving set and loud speaker in the auditorium and a receiving set and individual ear phones for each bed in the infirmary unit and the two cottages.

The Children's unit, consisting of a detached four-story building with room for sixty-five children ranging in age from birth to puberty, is divided into two services, educational and medical.

The lower floor is given over to recreational and educational life of the child and consists of a large play room for use during the stormy days and school room for academic and industrial purposes. This is a very important phase of a child's life in a tuberculosis sanatorium and one which I think is not stressed often enough. There is no reason why the education of the child should be interrupted in the least by his stay in the Sanatorium. His life there should be so regulated as to include time for class work. Usually because of his improved health he is able to carry on the required work in a shorter time than the child outside. For instance, all of our eighth grade children passed the State examination for entrance to High School. They were able to do this on two hours of supervised work per day. Even those children who are confined to their beds are able to carry on their class work while regaining their health.

In the summer time the school books are forgotten and the children spend their time in the fields and woods around the Sanatorium learning to know and appreciate the wonders and beauties of nature.

In the evening the children have a bed-time story hour, a feature which adds much to their life in the institution, making it more like home than anything else they do. All of this educational work is carried on by three teachers, two supervising the academic work and one the industrial work.

The medical work is carried on on the three upper floors, the first of which contains a dining room for all children able to come to their meals and two wards for boys over four years of age.

The second floor contains the Alpine or quartz mercury vapor lamp room and two wards for girls over four years of age.

The isolation rooms and wards for children below four years of age are on the top floor. This is really a deck house on a flat roof which is used as an uncovered porch and where these children receive sun baths and have their sand boxes, etc.

Each of the other two floors have an uncovered porch adjoining the wards, so that the children can be wheeled in their beds from the wards to the porch. This is the best type of treatment for the type of tuberculosis which usually occurs in childhood and with this treatment the results are nearly one hundred per cent perfect.

Thus the entire life of the child is cared for. When the time for leaving comes we try to send him out a little better child in every way than when he entered. Such a program should mean that, for the child at least, tuberculosis has not been an evil unmixed with good.

This summer the Sanatorium will open a summer camp which is a continuation of the former Visiting Nurses Camp, which was maintained under the Community Fund. The Visiting Nurses Association will supply the personnel and Dr. Lippman will have charge of the medical work as in the past.

The Staff has increased from one visiting and one resident physician, in addition to a superinten-

dent, to eight full-time clinical residents, Drs. Jennings, Bendes, Boquist, Mattill, Hastings, Fenger, Wall and Webb; a director of laboratory, Dr. W. L. Hardesty; two resident dentists, Drs. Bryant and Reppeto, and a pharmacist in addition to the laboratory and *x*-ray technicians. In addition to that we have been able to convince the University of Minnesota that there is something of real educational value in a tuberculosis sanatorium and every medical student has to reside three weeks in Glen Lake Sanatorium before he can receive his diploma. Also the University School of Nursing has assigned all students to the Sanatorium for a six weeks' residence before they can receive their nursing diploma. If Miss Gladwin of the State Board of Nursing Examiners has her way it will not be long before instructions in tuberculosis will be a required part of the curriculum of all training schools for nurses.

The Visiting Staff was changed to a Consulting Staff soon after the Sanatorium was opened. The Consulting Staff has grown with the growth of the Sanatorium, and consists of the following: Consultants Emeritus, Dr. J. W. Bell and Dr. G. D. Head; Active Consultants, Medicine, Dr. Henry Ulrich, Dr. Edward Gardner and Dr. Albert Peppard; Tuberculosis, Dr. W. J. Marcley, Dr. J. A. Myers, Dr. Alexander Josewich and Dr. Frank Hacking; Surgery, Dr. A. A. Law, Dr. Kenneth Bulkley and Dr. J. A. Johnson; Orthopedics, Dr. E. S. Geist, Dr. M. O. Henry and Dr. C. A. Reed; Ophthalmology and Oto-laryngology, Dr. Horace Newhart, Dr. W. E. Camp and Dr. E. R. Hansen; Obstetrics and Gynecology, Dr. J. C. Litzenberg and Dr. D. W. DeCarle; Pediatrics, Dr. F. W. Schlutz, Dr. Edward Anderson, Dr. H. S. Lippman and Dr. N. O. Pearce; Neurology, Dr. J. C. Michael; Roentgenology, Dr. R. G. Allison and Dr. Russell Gates; Urology, Dr. O. Owre and Dr. G. J. Thomas; Serology, Dr. D. Stern; Pathology, Dr. E. T. Bell; Bacteriology, Dr. W. P. Larson; Dermatology, Dr. Sam Sweitzer and Dr. John Butler; Public Health, Dr. F. E. Harrington.

It was hoped that when the entire six hundred beds were available for use the Sanatorium would be able to care for all of the applicants and still have some vacant beds for emergency use. But the Sanatorium is filled and has a waiting list of over fifty adults and is again faced with the prospect of only admitting the advanced case, i. e., the case who is denied treatment at the State Sanatorium because of his physical condition.

The Commission feel that, as the official agency charged by the 1913 Sanatorium law with caring for the tuberculous of this Sanatorium district, they have not discharged their full duty to the community as long as there are active cases of tuberculosis who wish care and cannot receive it.

The question to settle is, how best can this increased demand be met? Shall it be with additional sanatorium beds or in some other way, for example, by means of an out-patient department so equipped and financed that it would be able to offer bedside or sanatorium care to those who are waiting for admission to the Sanatorium? This out-patient department would, of course, reduce the time required for treatment after the patient reaches the Sanatorium and would therefore increase the turnover and thus have the same effect as increasing the capacity of the Sanatorium without the cost of the additional beds.

Such an out-patient department would be modeled rather closely after the Chicago Municipal Tuberculosis Sanatorium Dispensary, developed by the late Dr. Sacs and Dr. John Dill Robertson, former Commissioner of Health, which co-operates with the Health Department, the private physician, the employer and every recognized social and civic agency in the community in an effort to adequately meet the tuberculosis situation.

Since the Sanatorium offers the greatest measure of service in the treatment of tuberculosis, the out-patient department should endeavor in so far as possible to follow the sanatorium routine in the care of the individual patient. In order to assure this, the medical supervision of the dispensary should be under the care of one of the Sanatorium-trained physicians. The desirability of institutionalizing the open active cases from the standpoint of the community's welfare as well as that of the individual cannot be questioned. However, such a procedure, for obvious reasons, is not always possible. Without question the next best thing would be home supervision under sanatorium-trained physicians.

Cases under the care of private physicians should come under the supervision of the dispensary only in so far as compliance with the Health Department rules governing tuberculosis is concerned. The nurse makes an investigation of the home with

special reference to the sanitary and sociologic conditions and submits the report of the situation. She is prepared to carry out the attending physician's orders and to give bedside care if requested. The nurse collects a specimen of sputum for laboratory examination and leaves a copy of the state law governing tuberculosis with the patient. Otherwise the instructions relative to the prevention and treatment of tuberculosis are left entirely to the private physician and the dispensary physician does not interfere unless asked to by the private physician.

There has been a marked reduction in the death rate from tuberculosis during the past ten years. It is hoped that this reduction will continue and will more than compensate for the increase in cases incident to increasing population. If it does, then we are now at the peak of our load and if by means of an out-patient department, such as I have outlined above, we can tide over the present situation, the great expense of erecting more beds will be avoided and the taxpayers of this community will be saved considerable expenditure. At least, the Commission thinks the effort is worth a trial and that no money should be spent for additional beds until it is definitely proven that the dispensary system is inadequate.

THE FUTURE OF THE UNIVERSITY HOSPITALS

During the past year alone the University Hospitals have made a fourth of the stride between their 1924 status and 600 beds by adding to the original 200-bed capacity approximately 100 more, through the construction and opening the Memorial Cancer Institute and the Todd Memorial Eye, Ear, Nose and Throat units.

Ultimate construction of the Minnesota Hospital and Home for Crippled Children, for which William Henry Eustis is giving the funds, will add about 50 more beds to University of Minnesota hospital facilities. The hospital unit under the Eustis gift will be built on the campus, while the Convalescent Home will go on the property adjoining the Dowling School site which Mr. Eustis gave. It lies on the west bank of the Mississippi River near Minnehaha Park.

More than a year ago the Medical School announced plans that would involve the erection there of a Women's Hospital, a Home for Nurses, a Dispensary Building to house the department which already cares for 60,000 patients annually at no more cost to them than a registry fee of ten cents, an Administrative Building, an addition to the Service Building and the completion of the unfinished wing of Millard Hall, the main medical building. — *Minnesota Chats*, Jan., 1926.

FLOCCULATION IN TUBERCULOSIS *

W. L. HARDESTY, M.D.
Oak Terrace, Minnesota

The serum of the tuberculous is more easily coagulated by the combined actions of heat, sodium chloride, and alcohol than is the serum of the healthy. This fact constitutes the principle of flocculation reactions in tuberculosis, our knowledge of which begins with the works of Sachs and von Oettingen,[1] and Daranyi.[2]

It is generally admitted that this liability to flocculation is so much greater in tuberculosis than in health that the reaction is of some value. On a number of points, however, there is difference in opinion. Chief of these are:

1. The matter of technic.
2. Practical specificity of the test (i.e., to what extent may other diseases give the reaction).
3. Mechanism of the reaction.

Hoping to contribute data which may help clarify these points, the writer has carried out the reaction in 300 cases, comprising patients and employees of the Sanatorium, and guinea pigs, healthy and diseased. The work is being continued, but the results have been constant enough so far to warrant certain tentative generalizations, which will be presented in this paper.

A number of these reactions were performed before the question of technic had been decided—for the time being at least—by the writer. In a few others, the clinical condition was uncertain. None of these will be reported. No case whether of men or animals is here stated to be tuberculosis in which Koch's bacillus was not at one time or another demonstrated.

TECHNIC

The procedure which I have found most reliable is similar to that of Baum[3] and is carried out in the following way:

Into four test tubes place respectively 0.4, 0.3, 0.2, and 0.1 c.c. of serum, which must be clear, not colored by hemoglobin, unheated, and not over a day old.

To 41 c.c. of 2 per cent saline add 10 c.c. of 95 per cent alcohol. To each of the four tubes add 3.8 c.c. of this mixture.

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Shake the tubes, heat in a water bath at 60° C. for a half hour, set the tubes aside, and read the results after four or five hours. If in doubt, centrifugalize. A normal serum shows a distinct opalescence. If the serum be tuberculous, gross flocculation occurs in some or all of the tubes and white floccules may settle to the bottom. If definite flocculation occur in only the first tube, the reaction is recorded 1 plus; if in the first two tubes, 2 plus; if in the first three, 3 plus; if in all tubes, 4 plus.

Larger amounts of serum have been recommended, but I have found that such amounts occasionally give rise to weak positives in individuals presumably healthy. This does not apply to serum from the guinea pig, which is far less prone to error on the positive side. This difference is striking and constant.

SUMMARY OF RESULTS

FOUR PLUS REACTIONS

Clinical condition—	No. of Cases
Cavitation	15
Fibroid phthisis	4
Tuberculous nephritis	1
Tubercuous guinea pigs	15

THREE PLUS REACTIONS

Fibroid tuberculosis	12

TWO PLUS REACTIONS

Tuberculosis (old cases with little activity)	2
Tuberculous arthritis	2

ONE PLUS REACTIONS

Arrested tuberculosis	10
Healthy nurses	2
Tuberculous gland	1
Fibroid phthisis	1
Bronchiectasis	1
Incipient tuberculosis	1
Ulcerative tuberculosis, syphilis, and diabetes mellitus (one patient)	1

NEGATIVE REACTIONS

Healthy guinea pigs	50
Guinea pigs moribund in pneumonia	4
Arrested tuberculosis	4
Healthy individuals	2
Bronchiectasis	1
Advanced cavitation	1
Cholecystitis	1
Hyperthyroidism	1
Syphilis	1

From analysis of these data, it appears that:

1. Strongly positive reactions have occurred only in tuberculosis.

2. The intensity of the reaction is roughly proportional to the extent and activity of the process.

3. Weak positives are occasionally found in those with mild tuberculous infection and in individuals presumably healthy.

4. Negative reactions have occurred but once in active tuberculosis.

Thus it would seem that one great value of the reaction consists in its power to differentiate between active tuberculosis in which the bacilli are not found, and other diseases which clinically simulate it.

OTHER DISEASES AND THE REACTION

One might expect the reaction to be positive in other destructive diseases, notably syphilis, in which the plasma is so profoundly altered.

As to syphilis, I have not yet enough data to speak with assurance. We do not treat lues here except in so far as it is a complication of tuberculosis. From the evidence at hand I do not believe that syphilis gives the reaction in those who have not tuberculosis or accentuates it in those who have. To this phase of the problem our attention at present is being especially directed.

MECHANISM

In this reaction the colloidal molecules group themselves into amorphous floccules, remain for a while in suspension, and fall to the bottom of the tube. The reason for this colloidal instability we do not know.

Perhaps the most plausible hypothesis postulates a serologic alteration by the products of tissue destruction. If this assumption be correct, why does not syphilitic fluid give the reaction—if it does not? Elsewhere[4] the writer has expressed his belief that in syphilis the plasma is laden with products of tissue destruction and that these are largely responsible for the Wassermann reaction. Others appear to be of this opinion.

Here it is very important to remember that the tissues destroyed by *Treponema pallidum* are widely different from those destroyed by Koch's bacillus. The treponema attacks highly specialized cells, including those of the human brain and heart—highest cells in the biologic realm. Koch's bacillus has no such predilection. Thus it may be that serologic reactions in both diseases depend on tissue destruction but differ according to the kinds of tissue destroyed.

SUMMARY AND DISCUSSION

1. Flocculation in tuberculosis appears to have some value. The reaction may not—even in a practical sense—be specific. But this objection is

only relative and applies to most other laboratory determinations, as, for example, the white count.

2. In general, tuberculous serum has given positive reactions, the intensity of which has been roughly proportional to the extent and activity of the process.

3. Normal serum and the serum in diseases other than tuberculosis have yielded negative or weakly positive reactions.

4. The greatest value of the reaction appears to consist in the fact that it will help us to distinguish between active tuberculosis where the bacillus is not found, and other conditions which clinically simulate that disease.

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ETHYLENE AND NITROUS OXIDE AS ANESTHETICS

Ethylene produces greater relaxation than nitrous oxide, also much higher percentages of oxygen can be administerel with it and, therefore, cyanosis is not produced as with nitrous oxide. According to New and Non-official Remedies the advantages over nitrous oxide are equally rapid but more pleasant induction, satisfactory relaxation without cyanosis or sweating, and rapid recovery. The disadvantages of ethyline are the odor, the inflammability of the gas, and an apparently increasing oozing of the wound during its use. (Jour. A. M. A., Jan. 30, 1926, p. 368.)

CRYSTALLINE INSULIN

In a significant address—the sixth annual Pasteur lecture—recently given before the Chicago Institute of Medicine, John J. Abel made public announcement that he had obtained a crystalline form of insulin. The chemical and medical world will await with great interest further developments, particularly the proof of the identification and chemical constitution of the product. The crystallization of the pure principle "insulin" or a compound of it may well be considered an outstanding accomplishment in the life of a man already distinguished by his conquests in biochemistry. (Jour. A. M. A., Jan. 30, 1926, p. 350.)

RESTRICTION OF THE SALE OF BARBITAL (VERONAL)

While no laws have been passed in the United States against the sale of barbital, the New York sanitary code prohibits its sale without a prescription. In Useful Drugs it is stated that many cases of poisoning, some fatal, occur from the indiscriminate use of barbital by the laity. (Jour. A. M. A., Jan. 23, 1926, p. 297.)

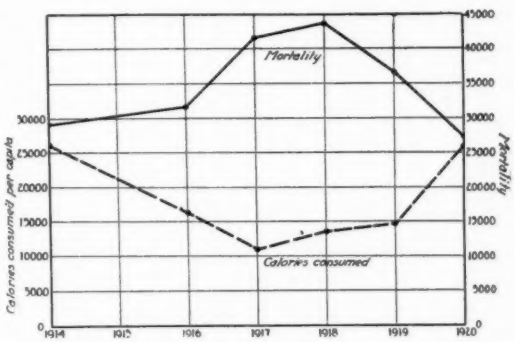
DIET IN THE TREATMENT AND PREVENTION OF TUBERCULOSIS *

J. A. MYERS, Ph.D., M.D.
Minneapolis

In the modern successful treatment of tuberculosis diet is second only in importance to rest.

The diet of the tuberculosis patient must be prescribed by the physician just as drugs are prescribed in certain other diseases. Numerous difficulties are encountered. For example, the gastro-intestinal tract may be in distress reflexly or because of toxemia. Again, on account of toxemia the patient may have marked loss of appetite. Furthermore, tuberculous enteritis not infrequently coexists with pulmonary tuberculosis, thus rendering the problem of diet very difficult.

If tuberculous enteritis is not present usually the gastro-intestinal disturbances disappear after the patient is placed at rest, and the toxemia is reduced. In any event the gastro-intestinal disturbance must be corrected at the earliest possible moment for it is obvious that with a disease like tuberculosis a good result cannot be accomplished unless a sufficient amount of food can be ingested, digested and assimilated by the patient.



Daily Food Requirement.—Much scientific study and observation has resulted in our possession of considerable very definite information about foods in tuberculosis. We know that food with a caloric value of between 2,500 and 3,000 is necessary for the average case and that much more food is undesirable. The food elements composing the necessary total amount should consist of 90 to 100 grams

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of protein, 80 grams of fat, 500 grams of carbohydrate and 2 quarts of water.

The proteins must be of the right kind. This is usually insured if 50 per cent of the protein is derived from animal tissues or animal products such as milk, butter, etc. The fat may be derived from butter and other food substances easily digested and rich in fats. The carbohydrates may be derived from sugars and starch-containing vegetables. An abundance of green leafy vegetables and fruits must be included in order to insure an abundance of vitamins in addition to those taken in butter, milk, etc. If such a diet is allowed one need have no worry about the mineral requirements of the body. In short the diet must consist of all the food elements necessary for maintenance and repair of the body.

Metabolism of the Body in Tuberculosis.—McCann and Barr[1] and Grafe[2] have found that in tuberculous patients with fever there is considerable rise in the metabolic rate, reaching as high as 20, 50 and even 75 per cent above the normal; whereas those patients with little or no fever have normal metabolic rates. Long[3,4,5,6] has pointed out that with fever this is to be expected because of the well known law in chemistry that raising the temperature increases the speed of all reactions. Thus with fever there is an increase in combustion of body fuel, which increases the temperature of the body and this in turn speeds up the chemical reactions. If excess heat elimination is not provided the fever is further increased and this in turn still further increases the speed of the chemical reactions; thus a vicious circle is established. Scientific observations have shown that even in advanced tuberculosis the respiratory quotient is normal, indicating that all types of foods are easily burned in the tuberculous patient.

Again, the tuberculous patient lying in bed may have such a severe cough as to require the expenditure of much energy and a consequent increase in metabolism.

Obviously whether the increase in metabolism is due to fever or cough or both, the only solution is to reduce the fever and decrease the cough. This is not always easy in either case. Absolute rest in bed will do much and will soon bring the temperature to normal and cause a complete subsidence of the cough in many cases. However, one encounters cases in whom the high temperature persists and the attacks of coughing continue in spite of the application of all known measures. In such cases the outlook cannot be good since they not only burn up the food they are able to take but also draw upon the foods stored in their tissues until a state of extreme emaciation is reached. For a long time it was believed that such patients should receive large amounts of protein in order to replace the protein that is being lost from the body. Indeed, it has been shown that patients suffering from wasting diseases such as tuberculosis and typhoid fever have a "negative nitrogen balance"—that is, more nitrogen is excreted in the urine even though very liberal amounts of protein are in the diet. This is good evidence that the protein of the body tissues is being destroyed even when an excessive amount of protein is administered in the diet. It appears that there is a definite "toxic destruction of protein" in tuberculosis and that the usual "protein sparing" substances such as sugars and fats do not suffice to prevent entirely this destruction. Long believes that the toxins derived from tuberculous foci may effect protein metabolism in the following ways: (1) they may so affect the appetite that the patient fails to take enough food to replace the daily loss; (2) they may injure the cells so that the cells fail to retain sufficient protein to make good their daily loss; (3) they may stimulate the cells to an excessive metabolism.

Enough scientific data have accrued that we can now quite accurately estimate the amount of food that is best in each individual case. From the foregoing statements it is obvious that the first attempt should be to reduce the cough, fever or any other condition that increases metabolism. All too frequently in the past and occasionally at the present time the first attempt has been to employ forced feeding. This is done on the ground that an excess of food elements brings about reconstruction as fast as destruction occurs. Again it is believed by many that the healing process about the lesion goes on more rapidly if excessive amounts of food substances are circulating in the blood. There is no scientific evidence that either of these actually occurs in tuberculosis. It is true that in certain cases with fever a reasonable amount of food easily digested and assimilated may be allowed in addition to the regular meals. However, there is no excuse for the huge amounts of food consumed under compulsion by some patients. One occasionally meets

a patient who has taken food with a daily caloric value of between 5,000 and 7,000. McCann,[7,8] Long and others have pointed out that from the standpoint of metabolism a considerable burden is thrown upon certain organs, particularly the lungs, when forced feeding is employed. For example, water and nitrogen, two end-products of metabolism, are excreted largely through the kidneys, while carbon dioxide is eliminated by way of the lungs. It is the carbon dioxide elimination in which we are most interested in tuberculosis since in the combustion of all foods it is an end-product. The more food the patient consumes the greater the amount of carbon dioxide produced. Since this is all eliminated through the lungs one reaches a point where its concentration is so high as to require more frequent breathing for its proper elimination. This is all brought about involuntarily through the respiratory center. In the treatment of pulmonary tuberculosis our greatest aim is to rest the lung through reducing the number of respirations per minute. Obviously in forced feeding we are defeating our aim.

In building a diet for tuberculous patients one must not neglect the vitamin requirement of the body. Obviously all known vitamins are of importance but of greatest importance is vitamin A. When it was first known that natural or artificial sunlight would prevent and cure rickets, a logical thought was that sunlight would substitute for vitamin A. It was first believed that vitamin A was the antirachitic element. Careful scientific investigation by Hart,[9] Steenbock, and others, however, revealed the fact that vitamin A is essential for the growth of chicks. We also know that when young animals such as rats are fed upon a diet wholly lacking in vitamin A they continue to grow for a short time because vitamin A is stored in the tissues. When this supply is exhausted, growth ceases and after a short time the animals begin to lose weight. A point of great significance is that after the vitamin A is exhausted there appears a lowered resistance on the part of the body to bacterial infection. This is particularly true of infections of the respiratory tract. Indeed, it has been pointed out by Sherman and McLeod[10,11] that when rats are fed over a long time upon a diet low in its vitamin A content "there appears in early adult life an increased susceptibility to infection and particularly a tendency to break down with lung disease at an age corresponding to that at which pulmonary tuberculosis so often develops in young men and women." The bacillus involved is different; but the close parallelism of increased susceptibility of the lung to infection at this stage of the life history appears very significant, especially in view of the fact "that the vitamin A content of lung tissue varies with that of the food."

Vitamin A is present in butter, cream, cod liver oil and certain of the green leafy vegetables. Before its distribution in foodstuffs was as well understood as at present and indeed before vitamines were known at all, cod liver oil was prescribed extensively in tuberculosis. Now we know that cod liver oil contains nothing of importance in the treatment or prevention of tuberculosis that is not abundantly present in certain palatable foodstuffs. This is welcome news to the thousands of sufferers from tuberculosis who in the past have taken huge quantities of cod liver oil under protest. Please do not misunderstand me. I do not mean to decry the use of cod liver oil or to discredit its value. In homes where a sufficiency of butter, cream and green leafy vegetables are not available or will not be taken by the patient cod liver oil serves a real purpose. Again, for patients to whom it is not objectionable, it may serve a real purpose. In most cases, however, if it is left to the choice of the patient he will secure his vitamin A requirement from palatable foods and receive just as much benefit as though he were taking cod liver oil.

In addition to vitamin A, cod liver oil also contains the anti-rachitic element. That these are two distinct substances has been demonstrated by oxidizing cod liver oil until the vitamin A is all destroyed and finding it still possessed of its antirachitic qualities. Here again a substitute has been reported for cod liver oil in the proper exposures to natural or artificial sunlight. Hess[12,13] and others have shown that not only the therapeutic but also the preventive effects of sunlight are as good as those obtained from the use of cod liver oil.

During and after the world war there existed a remarkable period for the study of such subjects as the effects of reduced food rations upon the incidence and mortality of tuberculosis. Selter and Nehring[14] compared the mortality statistics of the Health Department of the German Government for all German cities with a population of 40,000 and over at four-week intervals. With the mortality statistics they compared the calories consumed daily

per capita. The accompanying chart shows the increase in tuberculosis mortality accompanying the drop in average food calories per capita and the return to the normal in 1920. These authors point out that the privations, especially the diminished rations brought on by the war, caused the death of many tuberculous persons who during normal times would have lived much longer. This was in addition to the greater incidence of tuberculosis arising from war conditions.

From the scientific studies that have been made, therefore, we know the approximate daily food requirement of tuberculous patients. We have sufficient evidence against forced feeding and sufficient knowledge about the vitamin requirement of the body to aid the patient very materially in his battle with tuberculosis, but infinitely greater than these applications of foods in the treatment of tuberculosis is the application of our knowledge to the prevention of tuberculosis.

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TONSILLECTOMY IN THE TUBERCULOUS *

HORACE NEWHART, M.D.
Minneapolis

The attitude of the average physician toward operative procedures on those afflicted with an active pulmonary tuberculosis, especially in patients requiring a general anesthetic, has long been one of extreme conservatism. There exists a widespread and deep-seated tradition that all operations on the throat in the tuberculous, especially tonsillectomy, are likely to produce exacerbation of the existing pulmonary disease.

This tradition, in the light of recent experience in this institution (the Glen Lake Sanatorium for Tuberculosis), seems to be largely a fallacy, and, in the interests of the many patients who are entitled to the best and most modern therapeutic effort, should be challenged. This occasion seems to afford an opportune moment to raise the question as to the tenability of our old views on this subject and to ask if they cannot be profitably revised.

The old arguments against tonsillectomy in a patient with pulmonary tuberculosis are chiefly of two classes:

1. It has been claimed that the struggling of the patient, incident to a throat operation, especially during and after a general anesthetic, is likely to cause a spreading of a localized focus through the breaking down of nature's barriers. This is probably less true when the operation is skillfully performed under a local anesthetic; but even then we see in certain cases more or less violent gagging, coughing and nausea, with occasionally aspiration of mouth content or the swallowing of blood.

The second important argument against tonsillectomy in these cases is found in the definite nutritional disturbance which has in the past usually followed removal of the tonsils. This has been caused by the traumatism and the consequent reaction following a tonsillectomy, with interference with deglutition and a greatly diminished intake of food. The result has been a material loss in weight and a lowered body resistance with a supposed possible exacerbation of the disease. Of scarcely less importance is the possible lowering of vitality through loss of blood at the time of operation or through secondary hemorrhage.

Opposed to these objections we have a great

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unanimity of opinion as to the desirability of removing every possible known focus of infection such as pathological tonsils, dento-alveolar abscesses, chronic para-nasal sinusitis, chronic otitis media, etc., in patients generally. No one questions the tremendous advantage to the general health of the individual from tonsillectomy when it is definitely indicated and is properly performed. We need only refer to the convincing publication of Kaiser* on the Effects of Tonsillectomy on the General Health of 1,200 School Children as compared with an equal number not operated upon, or we need only ask any observant physician to recall individual cases in his own practice to vindicate this statement. Yet many in private practice even today hesitate when it comes to giving the benefits of a tonsillectomy to a tuberculous patient, in spite of the presence of obviously diseased tonsils.

In this institution, which I believe is justly recognized for its progressiveness in all matters pertaining to the study and care of this particular class of patients, the principle has become well established to give to the tuberculous patient the same opportunity for physical gain through the removal of pathological tonsils as is given to the non-tuberculous patient. In other words, unless the patient is in a hopeless condition, tonsillectomy is advised to free the patient of an existing handicap in the form of diseased tonsils, in spite of the presence of tuberculosis. Accordingly a very generous policy has been followed in giving the tuberculous patient at Glen Lake this benefit of the doubt.

Between April 17, 1919, and May 23, 1925, with a total of 1,490 admissions, 122 tonsillectomies have been performed on tuberculous individuals. Of these, 81 were on adults under local anesthesia and 41 on children, when a general anesthetic was employed. These operations were performed largely by Drs. Camp, Hansen and myself, under a technic which is practically uniform in all essential details. The results have been surprisingly gratifying. Of the 122 cases only one did not prove satisfactory as to the ultimate outcome and there exists the possibility that her death may have been hastened by the operation, though of this we have no proof. The others for the most part have done well, and in many instances date the beginning of a marked improvement to the tonsillectomy.

In consequence of these results, though the total number of cases may seem small, we are ready to affirm that in our opinion the tuberculous subject under institutional care is as good a surgical risk for tonsillectomy as the non-tuberculous, the benefits to be derived from the operation far outweighing the slight risk of spreading the disease through operative procedure.

It is our practice in this institution to avoid by all possible means those untoward results mentioned above and which have been feared in the past. A painless, speedy, clean operation with the minimum amount of traumatism, hemorrhage and gagging is always sought. Even in operations under local anesthesia the aspiration of mouth secretions is obviated by posture and by allowing the patient the utmost freedom in the matter of permitting him to expectorate frequently during the operation. This and the assurance to the patient that he is to consider himself under no bodily restraint goes far to do away with all struggling, gagging and coughing. General anesthesia is administered most carefully in order to eliminate all struggling, cough, and the aspiration of mouth secretions and blood.

All patients are carefully selected by the resident staff as to their fitness for the operation, special attention being given to temperature and clotting time. Naturally the most favorable results are to be expected in young tuberculous patients, who often have pathological cervical glands resulting from infected tonsils.

A very large factor which has contributed to the successful results in the cases cited is the extremely good pre-operative and post-operative care routinely administered at this institution. The nutritional needs are particularly well met both before and after the operation and the patient remains in bed for many days after the tonsillectomy. The result is a far smaller loss in weight than occurs in the average private ambulatory tonsillectomy, or the one who remains in the hospital but a day following the operation.

Herein lies a valuable suggestion for the after-care of our patients, whom we often dismiss too soon and without adequate instruction or supervision as regards intake of food and rest.

With no other basis than the relatively small experience in tonsillectomy on the tuberculous gained at Glen Lake, I am confident that the operation should be performed much more frequently than has been the usual practice, thus giving to those afflicted with the great white plague a better chance to fight out the long battle towards health.

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THORACOPLASTY IN THE TUBERCULOUS *

A. A. Law, M.D.
Minneapolis

While artificial pneumothorax is a therapeutic agent of infinite value in most cases of unilateral pulmonary tuberculosis, in 20 per cent of the cases where it is indicated it cannot be effectively used. This 20 per cent comprises the cases where the diseased lung cannot be collapsed by the injected gas, because of adhesions between the visceral and parietal pleuræ. These patients, because of failure of lung collapse, are many of them relegated to the class of hopeless incurables. Two-thirds of them have been shown to die early, while of those who can be collapsed by gas, approximately two-thirds recover.

When frequent attempts at artificial pneumothorax fail, these one-sided cases of pulmonary tuberculosis must have recourse to surgery for their hope of relief. It is this small class of cases which can be offered relief by extra-pleural thoracoplasty.

This operation as it was finally standardized by Brauer, Frederich and Sauerbruch, consists of a long paravertebral incision close to the spine and removal of segments of all the ribs except the twelfth. These segments vary in length from 2 cm. in the first rib to 15 cm. in the lower ribs. The removal of the ribs subperiosteally and without invasion of the pleura permits a collapse of the chest wall with coincident collapse of the affected lung.

While this operation ideally should be undertaken only when one lung is involved, yet in practice it is rare that, with extensive involvement of one lung, we find no involvement of the other lung. So that with inactive tuberculosis or with slight involvement of the "well" lung the operation is not contraindicated.

The ideal case for operation is the chronic one of long standing which has undergone considerable fibrosis so that contraction has already displaced the diaphragm, heart or mediastinum. In this type of case removal of the ribs on one side does not invite very much further displacement with its attendant danger of mediastinal flutters.

By preference this operation should be done in two stages. Sections of the five or six lower ribs (leaving the twelfth) should be removed first. Within three weeks if possible the upper ribs should be removed. The short interval between the first and second stage operations is indicated because new ribs reform from the periosteum of the ribs which have been removed. These new ribs reform early, so that if the interval between the operations is too long, the new ribs may defeat the object of the operation.

The surgeon who does this operation is only the instrument of the tuberculosis specialist, who should keep each case to be operated under prolonged careful scrutiny, preferably in a sanatorium, before the surgeon is called in. It is distinctly the province of the internist to dictate the advisability of operation. These cases demand, then, the closest cooperation between the internist and the surgeon.

Because this operation is of necessity performed upon patients who are poor surgical risks, it must of necessity carry a high mortality rate. In the hands of all operators this mortality has been from 10 to 15 per cent within the first 6 weeks, yet when we consider that most of these unfortunate patients are doomed to die of tuberculosis, we believe the hazard of the operation should be faced.

Up to date of this publication we have operated upon thirty-one different patients and have done fifty-eight operations upon them. We have only lost one directly from the operation. This was a one-stage operation and the man died of shock.

In all of our cases we have used local nerve block with novocain supplemented by nitrous oxide gas and oxygen analgesia. Each patient is given morphine, gr. $\frac{1}{6}$, and scopolamin, gr. $\frac{1}{300}$, an hour before operation.

As to results, our own cases are too recent to draw definite conclusions from, but Alexander has studied 1,024 cases operated (our cases are included in these) and found 32 per cent were cured and 26 per cent showed marked improvement; surely such hope held out to these unfortunates is ample argument for the operation of extrapleural thoracoplasty.

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THE PROGNOSIS OF TUBERCULOSIS IN INFANCY AND CHILDHOOD *

FREDERIC W. SCHLUTZ, M.D.
Chief of the Department of Pediatrics, University of Minnesota
Minneapolis

The prognosis of tuberculosis in infancy and childhood differs in some respects from that of the adult and is dependent upon several important factors. It is affected by the age of the child, being proverbially bad the younger the infant and improving steadily with increasing age. A factor much more important than age is the localization of the process. If it remains confined to bronchial or mesenteric glands, there is decided possibility of complete healing of the process. If the skin, bones and joints, or the peripheral lymphatic glands are involved, the prognosis as regards life and function is always very favorable.

Tuberculosis of the pleura or of the peritoneum, while more serious, is not altogether bad. With present-day treatment complete healing and cure is effected in many of these cases. Tuberculosis of the intestine seldom heals. Miliary tuberculosis and meningeal tuberculosis are hopelessly fatal. The same is not quite true of tuberculosis of the brain substance proper. A certain proportion of these cases will recover.

The prognosis of tuberculosis in the infant under one year is today not quite so pessimistic as it formerly was. It is still extremely grave under six months but even for this age the mortality figures are decidedly lower than the ones formerly reported. While the mortality under one year of age is often quoted as high as 85 per cent, it lies nearer 50 per cent for the second year and is even better for the third and fourth years.

The tendency of tuberculosis to rapid generalization and dissemination in the very young infant is the fatal factor which determines the high mortality. This leads so easily to the miliary form or to meningeal tuberculosis.

The localization and the clinical course are, as in the older child, very important factors in the prognosis in the infant. Where the tuberculous process is confined to the lymphatic glands and the infant remains free from fever and continuously gains in weight, the outlook is very good. Particularly favorable cases are those in which the process only specifically affects the eyes, the skin, or the bones and joints.

Extensive involvement of the lung parenchyma or general involvement of the internal organs is grave and the issue, almost without exception, fatal. Peritoneal and intestinal tuberculosis is comparatively uncommon in the very young infant and is hardly seen before the third year.

Positive tuberculin reactions always mean active tuberculosis in the young infant. In the older child this is not the case. They always indicate the presence of tuberculosis but by no means decide the question whether the process is active or latent.

It is still a mooted question whether the offspring of tuberculous parents inherit a disposition to the disease. A preponderance of opinion inclines against this probability, although no accurate clinical observer will deny the fact that offsprings of tuberculous patients are ne'er-do-wells from the very beginning and respond with exasperating indifference to the most painstaking effort in care and feeding.

The principal cause of the development of tuberculosis in the infant is doubtless postpartum infection and disposition to it acquired through bad hygienic environment and the influence of intercurrent acute infectious diseases. The prognosis depends a good deal upon the source of the infection and the condition of the contact, particularly with reference to the possibility of constant reinfection. In this connection, the interesting observation has been made that the illegitimate infant has a far better prognosis than the legitimate, because he is certainly and easily removed from a tuberculous environment and in that way escapes the danger from constant reinfection by tuberculous parents.

Massiveness of infection and virulence of the bacilli are other factors which play no small role in determining the prognosis in infantile tuberculosis. The state of nutrition can easily deceive. The infant organism will often keep in good state of nutrition for a long time in face of an unfavorable prognosis. Persistent and prolonged temperature rises over 101-102°, if referable to the tuberculous infection, give the case a serious aspect.

The question whether infants who survive the infection present a specific tuberculous habitus and are more vulnerable to reinfection in later adult life is not fully decided; but again the preponder-

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ance of clinical observation seems to incline to the opinion that this is not the case.

In the older child the prognosis of tuberculosis is, with few exceptions, entirely favorable. It is particularly good between the ages of three and ten years.

Miliary, disseminated, generalized pulmonary, intestinal and meningeal tuberculosis are always grave at any age and generally terminate fatally but in all other forms the tendency is always toward healing and ultimate complete recovery.

In the prognosis of surgical tuberculosis, one must not forget that the external lesion is in all probability only a metastasis of an internal lesion. It is of paramount importance for the prognosis to be informed about the extent of the internal lesion and to determine whether you have closed or open tuberculosis.

Rollier[1] of Leysin reports a series of 450 closed cases, of which 393 healed and only five died. Of 200 open cases, 137 healed, twenty died and the rest remained stationary or were only slightly improved. These figures quite clearly indicate the difference in the prognosis of the closed and the open case of surgical tuberculosis.

Tuberculous glands of the neck quite commonly clear up. They may caseate and break down or they may calcify. Except for the cosmetic defect, the prognosis is good.

In the prognosis of bone and joint tuberculosis, one must approximately estimate the time factor. The prognosis is generally good but the cases run a long course. There seldom is recovery under three or six months. In some cases of spondylitis it may even last two years.

One of the drawbacks to certain and progressive recovery from surgical tuberculosis lies in the prolonged hospitalization of these cases and the neglect to stress diet and hygienic factors as is done in many of the other forms. Extensive pulmonary involvement often has taken place before complete inventory of the case has been taken. Feverish efforts are then made to place the child under ideal surroundings but unfortunately it may be too late.

Pulmonary tuberculous lesions determined solely by the roentgen ray generally permit a favorable prognosis. They often heal without any therapeutic aid.

If there is extensive tuberculous infiltration, the prognosis is much more grave and very grave if the tuberculosis is open. The outcome of most of the open cases eventually is fatal.

Tuberculosis of the hilus region offers a better prognosis than that of the apices or other parts of the parenchyma.

Pulmonary tuberculosis showing signs of consolidation is more favorable than the case showing moist râles.

Continued high pulse with persistent high temperature is a bad sign even if there is not much weight loss. Increase of leucocytes, especially eosinophiles, is generally a good sign. The prognosis of pulmonary tuberculosis is not so favorable near puberty as it is earlier in the child's life.

Tuberculous pleurisy is relatively infrequent in childhood. It is not often complicated by simultaneous pulmonary involvement. The prognosis is decidedly favorable. The most extensive pleural thickening may entirely disappear.

Peritoneal tuberculosis has a more favorable prognosis in the child than in the adult. It is bad during infancy and very early childhood but the disease is quite uncommon during this age. If the peritonitis develops rapidly, the prognosis is rather better than if the onset is gradual. The former is generally exudative, the latter probably adhesive in type. Low temperature is generally a favorable sign but cases do recover in spite of persistently high temperatures. Pronounced enlargement of the abdomen, increasing anemia, and the occurrence of edema are unfavorable signs and warrant a bad prognosis. A peritoneal tuberculosis which extends beyond a half year will probably heal.

Mesenteric gland tuberculosis tends to spontaneous recovery. Intestinal tuberculosis, on the other hand, is a gloomy chapter. If there are multiple ulcerations, the case will seldom live beyond a half year, although remissions may occur and the ultimate fatal outcome may be deferred for several years. Isolated ulcers may heal.

Perforation of an ulcer generally results in diffuse peritonitis with fatal termination, but a localized circumscribed abscess can form. This may perforate externally, generally near the umbilicus, and a fecal fistula results. Such a case frequently heals and may completely recover.

Miliary tuberculosis and meningeal tuberculosis are hopelessly fatal. The course is rapid and progressively bad. Meningeal tuberculosis is generally fatal within four weeks.

In the world literature there are isolated reports of recovery from both conditions. V. Bokay[2] collected reports of twenty-nine cases of healed

meningeal tuberculosis. Most of these cases complied with the most critical requirements and seemed therefore fairly authentic. The cases which recovered were all over two years and most of them beyond the seventh year. In spite of these few reports, it nevertheless is quite clear that the possibility of a recovery from either condition is an enormous exception.

Tuberculosis of the brain substance is not so fatal as the meningeal form. There is more possibility of healing and calcification of the processes.

Just what connection exists between adult tuberculosis and that of childhood is not yet quite clear. There is not enough evidence to prove that tuberculous infection in infancy and childhood, even if apparently recovered from, predisposes after all to reinfection in later adult life. The impression prevails that this is not the case and that tuberculous infection of early childhood once vanquished and healed leaves the organism rather more immune to the dangers of a new infection in adult life. It should be possible to prove this contention by careful observation and epidemiological study. The problem challenges investigation and should have the interest and attention of every clinician.

The prognosis of tuberculosis in infancy and childhood is more hopeful today than it ever was. If modern therapy is faithfully and intelligently carried out, it is good in the majority of cases.

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"It was a common observation during the World war that, among the inhabitants of the countries participating, neurasthenia practically disappeared—simply because the people were so busy with war work that they had little time to think about themselves. To all of you who are victims of nerves, the lesson should be obvious: get work to do and do it with your whole heart; and in addition, cultivate a love of good books and music—do not confine your choice of reading to the sensations in the daily press nor the highly colored trash with which the news-stands are filled, nor of music exclusively to 'jazz'; refrain from taking part in conversations which are more suited to the operating room and morgue than to social gatherings; cultivate a hobby. If you can not engage in one of the many sports, you may at least learn to walk and enjoy it. When walking, breathe deeply, keep your head up, look and listen. There are many things to be seen and heard by the pedestrian which escape the notice of occupants of rapidly moving motor cars." — Dr. Matthias Nicoll, Jr., Radio Health Talk No. 191.

TUBERCULOSIS AND PREGNANCY *

J. C. Litzenberg, M.D.
Minneapolis

This is a subject teeming with economic as well as medical significance. It is not only our duty to consider the rights of the child, and to take into consideration the ultimate welfare of the woman, but we must also consider her value to society and as a mother to other children.

Tuberculosis is one of the gravest complications of pregnancy, in spite of the fact that in many cases there is an apparent early improvement in the general condition of the pregnant tuberculous woman. She may put on fat and look and feel much better after conception, but this benefit is only apparent, is usually transitory, and even in those women surviving the labor and the puerperium death is usually hastened. *X*-ray pictures show that even while the woman is putting on fat and feeling better the pulmonary tuberculous condition is rapidly progressing. Ultimately an untimely end occurs in a large percentage of cases.

As early as 1850, Grisolle called attention to the deleterious effect of pregnancy upon the tuberculous, and Labert in 1872 observed that there was an increased death rate in pregnant tuberculous women. Ruehle in 1873 was the first to explain that there might be an apparent arrest of the disease early in pregnancy, only to be followed by a fatal termination soon after the birth of the baby. He further observed that the oftener pregnancies occur and the shorter the interval between them the surer it is to be fatal. Frederick Mueller in 1901 emphasized the danger of tuberculosis when women become pregnant and advised against marriage. Cornet called attention to the fact that tuberculosis often progressed to the acutest form after the puerperium, and Kanimer in fifty cases stated that there was an increase in the disease in 66 per cent of the cases, and the mortality was 24 per cent. Lobenstein of the New York Lying-in Hospital, analyzed one hundred cases as follows: "There was aggravation of the tuberculosis in every case. The so-called fibroid phthisis was the least affected. The severe cases all showed marked decline during the last three months of pregnancy, and in the advanced

*Read before the Hennepin County Medical Society, at Glen Lake Sanatorium, Oak Terrace, Minn., June 8, 1925.

cases there was an exaggerated increase of all symptoms. Even in the mild cases 19 per cent died soon after delivery; in 50 per cent of the severe cases, 17 per cent died within one month after delivery, and an additional 2 per cent before the end of the third month. Seven per cent of the babies were stillborn, and 13 per cent died in the hospital. There was a marked aggravation of the disease in 84 of the 100 cases, and in only 16 per cent of the cases, namely, the fibroid phthisis, was there only a slight increase of the disease."

In Senator's clinic 66 per cent of tuberculous pregnant women were deleteriously influenced. Of twenty-three tuberculous women fourteen died during labor and seven within a few days after labor.

From the beginning of the study of this subject all statistics confirm the conclusion that pregnancy increases the tuberculous process in the lungs. While the general consensus of opinion is that the tuberculous should be forbidden to marry, and the married tuberculous should be forbidden to conceive, and that the pregnancy should be interrupted under certain conditions, there are on the other hand extremists both among obstetricians and specialists in tuberculosis who believe that the pregnancy should never be interrupted, while others on the other hand aver that pregnancy should always be interrupted, whatever the stage of the disease or the period of gestation. Either of these extremes is manifestly too radical. Those who think conservatively on this question believe that the pregnancy should be interrupted only in the mild or incipient cases of tuberculosis during the first three months of gestation, because these women can be saved for future usefulness to their families and to the community, and even for further childbearing.

In our experience the interruption of pregnancy after the first three months has not given us the desired results. Mild cases seen after the first three months may be allowed to go to viability or to term. Some believe that if growing worse the pregnancy should be interrupted, but according to our observations interruption of pregnancy after the third month is attended by such doubtful results that it is probably better to take the chances of the continuing pregnancy.

While tuberculosis is supposed not to be a frequent cause of abortion, Bernheim found that 23 per cent of 315 pregnant tuberculous women spontaneously aborted. Even if women are successfully delivered the puerperium seems to be the great danger period both to the mother and child. The tuberculous mother should not nurse her child because of the dangers of infection to the baby, and also on account of the tremendous nutritional tax upon the mother.

DuBois has very tersely summed up the question in the following words: "If a woman with phthisis marries she may bear the first accouchement well, the second with difficulty, and the third never."

The pernicious influence exerted by pregnancy upon the tuberculous woman applies chiefly to the respiratory tract; local lesions in other organs are not so profoundly affected except in the cases of laryngeal tuberculosis. If pregnancy exerts such a baleful influence it seems to be a safe conclusion that a therapeutic abortion should be performed. However, in doing this we must realize that we are treading on dangerous ground; for we must meet not only religious convictions but the possibility of having our motives maligned, and the way opened for the unscrupulous to take advantage of a valuable procedure to cover their criminal acts. First of all it is not our function to attempt to combat the religious beliefs of anyone, and in taking into consideration the sacrifice of the life of the fetus the question must be approached conscientiously and according to the loftiest ideals of our profession, bearing in mind all of these objections, and the honest differences of opinion in the profession, I do not hesitate to say that during the first three months of pregnancy therapeutic abortion in the interest of the patient, the family and the community, should be resorted to in the incipient and mild cases. For the sake of sounder judgment and protection of all concerned, at least two consultants should be called.

Bumm of Berlin agreed that early mild cases should be aborted, but he asserted that "in advanced cases there is not much hope through an early abortion, but it may be done with the hope of doing the mother some good where she stands very little chance of going to term, for if the baby is born alive it will probably not survive long." Pottinger holds the same opinion, as do many others, but I am not impressed with their statistics. I am far from convinced that we are justified in

doing a therapeutic abortion for anything else than for saving the mother's life. To undertake so grave and abhorrent a procedure as sacrificing the life of the fetus with only the remote hope of doing the mother some good, is, to say the least, a very doubtful procedure. The statistics offer so little proof that improvement may be expected except in early cases that I gravely doubt its justification in advanced tuberculosis or pregnancy much beyond three months. Of all the indications for abortion tuberculosis of the larynx is the most urgent, not only because of the very great danger to the mother, but the tuberculous process can sometimes be arrested. If in any case the patient goes to full term, labor, especially in the second stage, must be made as easy as possible, and during the third stage unusual care must be taken to save every drop of blood possible.

RESULTS TO THE OFFSPRING

Although tuberculosis seems not to predispose to abortion, 7 to 10 per cent of the babies are stillborn, 12 to 15 per cent die in the puerperium, rather high percentage of immediate fetal deaths. Even if the child lives it is exposed to three great dangers: (1) inherited tendency to tuberculosis; (2) danger of contracting the disease from its mother; (3) the possibility of having had it directly transmitted in utero. These figures show that we do not owe overmuch consideration to the fetus, for its chances at best are not good. Therefore, we owe more consideration to the pregnant tuberculous woman, to her family and to society. We should save the lives of as many mothers as possible. Therefore, we may be quite positive in our opinion that in mild cases of tuberculosis and in early pregnancy therapeutic abortion is usually indicated. In borderline cases beyond three months of gestation the procedure is doubtful, and in advanced pregnancy or advanced gestation very little hope of improving conditions can be entertained. Therefore, I have come to a very conservative position. I believe that every obstetrician should look upon therapeutic abortion as a procedure which should never be undertaken except under the most positive indications, and such indications in pregnancy complicated by tuberculosis I see only in laryngeal tuberculosis and in early cases of pulmonary tuberculosis in early pregnancy.

TUBERCULOSIS OF THE ORAL CAVITY *

CARL W. WALDRON, M.D., D.D.S., F.A.C.S.
Assistant in Medicine, University of Minnesota; Assistant Medical Director Glen Lake Sanatorium
Minneapolis

Tuberculosis of the mouth may involve any portion of its mucous membrane and extend to involve the bony structure of the mandible or maxilla. The process occasionally starts in dental caries or disease of the investing tissues of the teeth. Central tuberculosis of the maxilla or mandible of hematogenous origin results in osteomyelitis, necrosis with abscess and sinus formation. The salivary glands may become the seat of tuberculosis infection.

Tuberculous lesions of the mucous membrane occur in two forms—tuberculous ulceration proper and lupus. The lesions of lupus are usually associated with facial skin involvement, and develop very slowly, remaining superficial with little tendency to ulceration or destruction of the deeper tissues. Groups of tubercles form with subsequent scarring and contraction. About 10 or 15 per cent of patients with lupus present oral lesions. Lupus may have its beginning in the mouth, or, what is more frequent, in the mucous membrane of the nose.

Ulcerative oral lesions of tuberculous origin are probably more frequent than has been suspected. Past statistics were largely derived from necropsy findings and minute examinations of the entire oral mucosa were usually lacking. American statistics of von Ruck,[1] and Morrow and Miller[2] showed the tongue involved in somewhat less than 1 per cent of sanatorium and hospital patients. Though somewhat less common, ulceration of the cheeks, alveolar mucosa, floor of mouth, palate and lips, may occur and the probable percentage incidence among sanatorium and hospital patients is about one-half of one per cent.

TUBERCULOSIS OF THE TONGUE

Two hundred and eighty-two cases have been reported in the literature.[2] In most cases infection takes place by the invasion of the mucosa of the tongue by tubercle bacilli from the patient himself, from the contact of sputum, through the blood stream (miliary type), or from the extension of lesions of neighboring tissues. Though doubted by

*Read before the Hennepin County Medical Society, at Glen Lake Sanatorium, Oak Terrace, Minn., June 8, 1925.

many authorities, the occurrence of primary tuberculosis of the tongue, though extremely rare, seems to have been proven conclusively at autopsy.

According to reported cases, most tongue lesions occur between the ages of forty and fifty, though the condition has been reported to develop at five and a half years and at eighty years of age. Men are far more frequently affected than women (five to one). This is attributed to pipe smoking, greater neglect of dental conditions and the holding of various things—nails, screws, etc., in the mouth.

Morrow and Miller describe three types of lesions: (1) *Nodular*, (a) superficial, and (b) deep; (2) *Ulcerative* (a) superficial, (b) deep, and (c) fissured; and (3) *Papillomatous* or *Warty*.

Most ulcers are preceded by a superficial nodule which often passes unnoticed by the patient until it breaks down and becomes painful and tender. This, the most common lesion, is usually superficial and may be small or very extensive. Its surface is usually covered with a yellowish grey mucus which on being wiped off reveals a granular surface, studded with reddish and yellowish elevated points. The margins of the ulcer are usually irregular and may be slightly undermined but not elevated nor indurated. Miliary tubercles at the edge of the ulcer are frequently seen. An area of erythema surrounds these superficial ulcers which may be multiple and later coalesce. These conditions tend to progress, gradually involving the deeper tissues with swelling and enlargement of the tongue.

Some ulcerative lesions tend to be fissured from the beginning and on the surface appear small; spreading apart the borders of the fissure may reveal deep, extensive and branching fissured ulceration.

The deep nodular forms show on palpation scattered areas of nodular infiltration covered by normal mucous membrane. These may go on to caseation without ulceration.

Papillomatous lesions of the tongue are rare and are more likely to involve the posterior portion of the dorsum, in the region of the circumvallate papillæ.

These lesions may occur in any part of the tongue, but seem to involve the dorsum, lateral borders and tip more often than the under surface or base.

The symptoms vary with the individuals, some complaining of marked pain, burning and tenderness, others apparently suffering but slight discomfort. With considerable involvement, pain, impaired mobility and salivation may be so marked as to interfere with eating and speaking.

Enlargement of the cervical glands is usually absent until ulceration has taken place. It is moderate in degree, and probably due in a measure to secondary infection. The tongue is naturally resistant to infection and its involvement usually occurs in late or terminal pulmonary tuberculosis. However, the occurrence of primary lesions and secondary lesions in unsuspected and relatively symptomless tuberculosis is sufficiently frequent to be made common knowledge. This has been emphasized by Ivy and Appleton.[3]

Tuberculosis of the oral mucous membrane presents similar characteristics to those already described in the discussion of lesions of the tongue. When affecting the region of the teeth and gums the appearance may be so modified as to obscure the diagnosis, particularly when the condition has come on after the extraction of teeth or in connection with injury of the alveolar tissues from faulty dental bridges or other restorations. Many cases are on record of the failure of extraction wounds to heal, subsequent ulceration, swelling, extension of the infection and delay in diagnosis. In children and young individuals such a condition may extend to involve the bone itself. Tuberculous periostitis and osteitis may go on to abscess formation and necrosis. Involvement of the maxilla may simulate antrum infection in its early stages. Later, the presence of sinuses and sequestration of bone along with chest findings clear up the diagnosis. Such maxillary involvements more often take place through the blood stream without local traumatism or apparent point of entry.

There are, then, two anatomical forms—one of alveolar origin, the other central. In the mandible, the alveolar portion and the region of the angle are most frequently affected. Tuberculosis of the mandible or maxilla may become superimposed on a pre-existing non-tuberculosis infection. In the early stages there is a hard, painful, non-fluctuating swelling involving the bone and overlying tissues. Later the pain and swelling increase with softening and abscess formation with similar involvement of the cervical glands. Sinuses appear which may lead to the bone itself or to a sequestrum. The course is slow and may take months or even years to reach such a stage. The *x*-ray may show both rarefaction and thickening.

Bony enlargements in the mouth, especially if accompanied by pallor of the gums and mucosa, are considered diagnostic of respiratory or circulatory disturbances by Kramer.[4] These conditions are allied to hypertrophic osteo-arthropathies and are of a *secondary nature.* Kramer has found enlargements of the alveolar process, bony processes of the jaws and hard palate in a high percentage of patients with pulmonary tuberculosis, the ratio increasing with the degree of pulmonary involvement. He states: "We have seen dentures displaced by this condition, and it often makes the proper fitting of them difficult. When the alveolar ridges are much thickened, extractions are made more difficult, and the thickening of alveolar ridges caused by this condition may be mistaken by the periodontist for hypertrophy caused by trauma or other irritation."

In observations on the effect of tuberculosis on the teeth, gums and jaws, Lester R. Cahn[5] draws the following conclusions: "Tuberculous disease can make itself manifest in the oral cavity, aside from tuberculous ulcerations and osteitis. These other lesions are: (1) Cervical cavities. (2) Gingivitis with loss of interdental papillæ, the space occupied by these papillæ being filled with a peculiar brownish sordes. (3) Large intertrabecular spaces revealed by the roentgenogram. This latter symptom is not always constant but occurs sufficiently often to be characteristic. Three illustrative cases are reported."

The diagnosis of tuberculosis of the oral cavity is by no means easy except when occurring in patients with established or advanced pulmonary tuberculosis. Lesions presenting in the apparently healthy must be differentiated from simple or traumatic ulceration, syphilis, carcinoma, etc. The history, clinical appearance, chest examination, serologic reactions, histologic examinations of excised tissue and animal inoculations may be necessary to clear up some cases. The general appearance, depth, edges, induration, pain and chronicity of the ulcer should be noted. The tuberculous ulcer is usually shallow, of granular surface with irregular margins. It is usually painful and tender and extends gradually.

Traumatic ulcers present an obvious local cause, such as a sharp carious tooth or defective dental restorations. Elimination of the trauma and oral sepsis result in prompt healing. It must be remembered that a traumatic ulcer may occasionally become infected by tubercle bacilli.

Syphilitic ulcers of the tongue are more frequent in the posterior portion and are, as a rule, deeper and present a more punched-out, ragged appearance, with little induration. The Wassermann reaction is positive in about 80 per cent of cases, and the therapeutic test of the administration of arsphenamin is usually conclusive. The coexistence of syphilis and tuberculosis must be kept in mind. The primary lesion of syphilis is more indurated, usually raised, and of short duration.

A carcinomatous ulcer is usually solitary and deeper, presenting irregular, raised, everted edges with marked induration. It is frequently associated with leukoplakia. Tuberculosis of the mouth and carcinoma occur at the same age, in the same locations and in the same sex. (This similarity is not generally known.) Epithelioma of the tongue must be diagnosed promptly to afford chance of cure.

The ulcerative lesions of ulcerative stomatitis, herpetic stomatitis, Vincent's stomatitis, erythema multiforme, foot and mouth disease, would rarely be confused with tuberculosis on account of the acuteness of their onset, more rapid course, earlier glandular involvement, and associated systemic or cutaneous symptoms.

Actinomycosis involving the teeth, alveolar process, central portions of the jaws and the investing tissues may simulate tuberculosis of the same regions. Examination of the exudate and the finding of the ray fungus makes the diagnosis of actinomycosis positive.

Clinical, chest and serologic examinations may leave a considerable proportion of tuberculous oral lesions undiagnosed. It may be necessary to excise the entire lesions for histologic examinations. By this means it is still at times impossible to differentiate tuberculosis from syphilis unless special staining methods for the tubercle bacilli are employed or an emulsion of a portion of the excised lesion is injected into guinea pigs. The recovery of tubercle bacilli from lesions in the guinea pigs is conclusive.

Tuberculosis involving the mandible or maxilla must be diagnosed from the more common forms of periostitis, osteomyelitis, necrosis, benign tumors of the odontome group, central giant cell tumors, sarcoma or carcinoma. Complete physical examination, laboratory and serologic tests are essential and the possibility of coexisting pulmonary tuber-

culosis and other lesions must be ever kept in mind. Lesions of the alveolar mucosa may come on after the extraction of teeth. The tooth sockets do not heal completely and soreness persists. Later, the characteristic "mouse eaten" appearance is noted. This clinical course should be kept in mind by the dentists, particularly those taking care of tuberculous patients.

Tuberculosis of the salivary glands must be diagnosed from chronic suppuration, calculus, von Mickulicz's disease, mixed tumors, carcinoma, actinomycosis, syphilis, lymphadenitis, cellulitis, etc.

TREATMENT

As most oral lesions occur in advanced pulmonary cases, the final prognosis is usually hopeless. Some observers feel that local treatment is of minor importance and lay great stress upon the general antituberculosis regime. Others report the cure of small oral lesions by excision, with prolongation of the patient's life and relief of pain and discomfort. In extensive lesions the cautery may be of some value. *X*-ray therapy, and Kromayer light advocated by some are found useless agents by others. Tuberculin therapy is advocated by Von Ruck, White and Marcey. The local application of antiseptics, such as dichloramin-T may be of service. The application of phenol and other cauterizing fluids is condemned. In secondary localized lesions without extensive chest involvement and in the rare primary lesions excision and sanatorium treatment may result in complete cure of the patient. Primary tuberculosis of the oral cavity presents the greatest possibility of cure by complete excision of the lesion followed by rest, nourishing food, etc.

Lesions of the alveolar process and jaw may require wide exploration, curettage and cauterization. This may of necessity be repeated at intervals over a year or more before final healing takes place. General systemic treatment is necessary to effect a cure. When occurring during the period of dentition, as is usually the case, teeth may be involved and lost during their formative period with consequent impairment of growth of the jaws, deformity and dental disability.

CONCLUSIONS

1. Tuberculous lesions of the mouth and jaws are more frequent than is generally supposed.
2. The ulcerative type rarely develops in a clean healthy mouth.
3. Tuberculous lesions of the lip, cheek, alveolar process or tongue may *precede* the onset of frank symptoms of pulmonary tuberculosis and be of diagnostic importance.
4. With the teeth and investing tissues made healthy by dental treatment and care, complete healing of localized tuberculous ulcerations may be expected after complete excision in both advanced and incipient pulmonary involvement.
5. The general therapy of the oral lesions is essentially that of tuberculosis of other parts of the body.

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J. T. CHRISTISON, M.D., St. Paul

EDITORIAL OFFICE
CARL B. DRAKE, M.D., Editor
402 Guardian Life Bldg., Saint Paul

BUSINESS OFFICE
J. R. BRUCE, Business Manager
402 Guardian Life Bldg., Saint Paul
Telephone: Cedar 1683
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Telephone: Atlantic 2716

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EDITORIAL

Immunization Against Diphtheria and Scarlet Fever Without Serum Sensitization

From the clinical observations of Bretonneau (1821) together with the discovery of the diphtheria bacillus by Klebs in 1883 and its isolation by Loeffler in 1884 combined with the study of the toxin produced by this bacillus by Roux and Yersin (1888) the clinical entity and etiology of diphtheria was established. After long experimenting Behring (1890-94) and others found that the serum of animals immune to diphtheria was a valuable remedial agent in the treatment of the disease. Since the introduction of diphtheria antitoxin the mortality of diphtheria has decreased from 55 to 6 per cent and lower. Trousseau, the father of modern tracheotomy, popularized this operation and devised the double tube now in use. The high mortality provoked a bitter opposition to this operation which persisted until 1880, when O'Dwyer, influenced by this high mortality, began his investigations on intubation which resulted in one of the greatest American contributions to pediatrics, namely the intubation tube. The next important contribution was the development of the Schick test in 1913 by means of which susceptible individuals might be detected. About 1895 Babes and Park independently began the use of injections of toxin-antitoxin mixtures to immunize animals for the production of antitoxin. In 1907 Theobold Smith suggested the possibility of producing immunity to diphtheria in man, which was finally accomplished safely by von Behring in 1913. Since that time, especially recently, a rapidly increasing number of children have been immunized against diphtheria by the administration of toxin-antitoxin. This procedure sensitizes these individuals to horse serum, and subsequent injections of various serums such as antitetanic, scarlatinal, antistreptococcic and the other serums derived from horses may possibly result in anaphylactic reactions. Several such instances are recorded in the literature. It is advisable, therefore, in administering serums to children previously immunized against diphtheria by injections of toxin-antitoxin mixtures, to attempt to avoid anaphylaxis either by desensitization of the patient by means of an initial injection of a very small amount of serum one hour previous to giving the entire dose, or by adding one c.c. of 1:1000 adrenalin solution to the serum immediately before it is administered. In addition a hypodermic injection of appropriate dosage of atropine sulphate may be of value in avoiding anaphylactic reactions.

As a result of recent investigations at the University of Minnesota a method is being developed by which children may be immunized against diphtheria and also against scarlet fever without being sensitized to serum. This indeed is a most valuable contribution which promises to enable the medical profession to be able to protect their patients against these serious diseases without rendering them anaphylactic to serum. The advisability of the avoidance of sensitization against horse serum evidently has been recognized by certain commercial concerns who are now using goat serum in their toxin-antitoxin preparations.

C. A. S.

The New Constitution

The Minnesota State Medical Association has been operating under a constitution adopted in 1914. As many of its provisions have become obsolete and as new conditions have arisen which should be provided for, the Council decided to have it revised and brought up to date. This revised constitution will be presented at the next state meeting for action by the House of Delegates.

One of the changes which we wish to discuss and which has been endorsed by the Ramsey County Medical Society is the formation of a Committee on Public Health Education. There is a present need for the proposed Public Health Committee in correlating the work of public health activities throughout the state and our profession. This need is likely to increase rather than diminish in the future and wise counsel will work to the mutual advantage of the public and the profession.

We feel that a number of years of careful scientific training are necessary to fit a man to practice medicine. We as a profession are slow to adopt new methods and cures until they have been proven adequate beyond the shadow of a doubt. To the public this slow scientific method is incomprehensible. That is why they rush to fraudulent patent medicines. That is why they put down our view of osteopaths and chiropractors as mere jealousy. How they look upon the cults is shown by statistics which indicate that irregulars in Wisconsin number 50 per cent (in Minnesota 20 per cent) of the medical profession. We consider it part of our duty to protect people (so far as they will let us) from harmful medication and incorrect diagnosis. But why not help both them and ourselves by taking them more fully into our confidence? The work of this new committee will be to help the average man and woman by means of better health education. This is not the task of a year; it is one of a lifetime. The Council firmly believes that steady persistent effort will in time convince people that our effort, as individuals and as a society, is directed scientifically toward making and keeping them well.

What are the lines of activity suggested? First, to encourage each county medical society to conduct annual public medical meetings. The variety of medical moving pictures that may be rented for a nominal sum from two New York firms is surprising. Surgical, medical and general public health matters are listed. If each county society puts on a public meeting to include a movie, *x*-rays of the entire body, and two or three short talks on such subjects as cancer, immunization and tuberculosis, one could feel assured that those attending would go home with a more intelligent viewpoint of the medical profession.

This year our radio committee has put on an exceedingly instructive course of public health talks, and their efforts are well worth while. The profession is entitled to use for itself all legitimate advertising channels,—to use them not for individuals but for the organized body of doctors.

Further, this new committee is to take measures to eliminate from newspapers throughout the state all fraudulent medical advertising. In this respect Minneapolis has a fine record; its two leading newspapers are free from quackery. Recently the Sunday issue of a prominent newspaper in another city in Minnesota displayed twenty-three medical advertisements, half of them fraudulent.

The last and perhaps most difficult duty of the committee deals with the abuse of free clinics by those amply able to pay for medical attention. The enthusiasm of laymen in building up a huge health service has in many instances gone beyond reasonable limits. Many women in St. Paul, for instance, feel as much at liberty to take their babies to the free clinic as to use the public library. From comments heard this sort of thing is not limited to the cities. If the functions of this committee are properly carried out so that from the medical standpoint these agencies are properly administered, we shall have less paternalism and less state medicine. It is estimated that in the St. Paul Baby Welfare Clinic 30 per cent of the babies of St. Paul receive free service, while 10 per cent is a fair estimate of the number properly entitled to such services.

The section of the new constitution dealing with this committee is as follows:

> Sec. 5. The Committee of Public Health Education shall consist of 5 members or as many more as the Council may determine. Its function shall be: 1st, to strive to develop an intelligent public viewpoint toward the medical profession; 2nd, to co-operate with the various agencies throughout the state whose function is the promotion of public health, and whose governing bodies are composed in whole or in part of laymen, so that from a medical standpoint these agencies shall be intelligently administered; 3rd, to use such measures throughout the state as may be necessary to eliminate fraudulent medical advertisements from the public press; 4th, to aid and encourage each component society to conduct at least

one annual public medical meeting; 5th, to encourage public health educational matters through the channels of the public press, radio, movies and the lecture platform.

The Modern Hospital

The modern hospital is a different institution from that of a generation ago. It will doubtless undergo certain modifications during the next generation.

Most private hospitals have been established on a semi-philanthropic basis. Expensive to administer, absolutely necessary in time of emergency, they have in the majority of instances been endowed, and are managed by trustees for the benefit of the people in the locality. Seldom run for profit they are able to operate at much lower rates than would otherwise be possible.

The Class A hospital must have certain equipment in the way of x-ray apparatus, laboratory and personnel which materially increases the cost of operation. The recently adopted twelve-hour nursing schedule further increases hospitalization expense in certain instances. This is all very well for the well-to-do patient but the increased cost of being sick in hospital is a distinct hardship to those of limited means who make up the great majority of patients.

The hospital, like everything else of value in this world, comes in for a certain amount of abuse. The unnecessary hospitalization of patients is probably the most outstanding. Physicians succumb too often to the temptation to hospitalize patients for their own convenience. Many patients can be taken care of just as well at home and when the added expense of hospital care is forced upon a patient unnecessarily the physician has lost sight of the golden rule. We are not referring to borderline cases which are subject to difference of professional opinion. Obstetrical and most operative cases require hospital care. Unnecessary hospitalization, however, accounts more than any other one factor for American cities being so generally oversupplied with hospital beds.

The medical staff of the modern hospital might save themselves and also their patients considerable expense by more co-operation. Instead of each staff member investing in expensive surgical, diagnostic and therapeutic apparatus the hospital might well make the investment to the mutual benefit of the patient, hospital and doctor. The present widespread practice among physicians of purchasing physiotherapy apparatus of limited value, too often from an honest fear of being unprogressive, and then using the apparatus for the thousand and one conditions for which it is recommended, is a poor practice. The newly proposed Council on Physiotherapy of the A. M. A. should help in standardizing the real value of the recent additions in physiotherapy. They have a limited value, and group use in a hospital is probably the solution of the present problem.

Much is heard nowadays about the passing of the old fashioned family doctor. The average graduate of today is a better informed doctor than the average a generation ago. There is no doubt but that patients today are being cared for by physicians with better general training than ever before. The hospital with its close professional contact in daily routine and in attendance at staff meetings affords the general practitioner a means of becoming a broader man and keeping up with progress in medicine.

We have tried to picture how the modern hospital can and in many instances is working in a broader way to the benefit of medical practice. Physicians through their influence as members of a staff can assist in developing the larger usefulness of the hospital and at the same time in keeping down the expense of hospital care.

Glen Lake Sanatorium

Last June the members of the Hennepin County Medical Society held a meeting at the Glen Lake Sanatorium, Oak Terrace, Minnesota, and listened to a symposium on tuberculosis presented by physicians and surgeons of the sanatorium staff. This symposium dealt with tuberculosis in its various phases and we are glad to devote this entire issue of the Journal to the publication of these papers. Nothing very new on the subject of tuberculosis is herewith offered. The papers give a good idea, however, of what is going on at this fine county sanatorium.

Tuberculosis mortality has shown a distinct decrease in Minnesota as a whole since 1918. We have no figures showing the morbidity rate, but presumably that has also decreased. Until 1918 there was no demonstrable improvement in the death rate from tuberculosis. It was not until 1913 that the county sanatorium law went into

effect and the full effect of this venture in state medicine has undoubtedly not made itself felt.

Tuberculosis still demands a serious toll from the citizens of our state and it is in the interest of carrying on unrelenting warfare against the white plague that this issue of MINNESOTA MEDICINE is being devoted.

OBITUARY

DR. A. J. GIBSON

Dr. A. J. Gibson was born in Stornoway, Scotland, July 1, 1870. He came to Duluth from Scotland in 1884 and took his high school course at the Duluth high school. Later he returned to Scotland and entered the study of medicine at Edinburgh.

After finishing his undergraduate course, he became a clinical assistant at the Royal Ophthalmic Hospital and also in the Great Northern Central Hospital, London; in the Quinze-Vingt Hospital, Paris, and later under Professors Killian and von Eicken, of Freiburg, Germany.

When the Boer war broke out he joined the British forces in South Africa and served during the period of that war. Later he entered private practice in Eye, Ear, Nose and Throat, first at Durban, then in Transvaal, South Africa.

After four years, he returned to England, then came to Canada and established himself at Victoria, British Columbia, working in a special field. In 1915 he joined the Canadian forces with captain's rank and went to Salonika.

After the World war, he settled in Duluth in the practice of his specialty, but was compelled to discontinue after a short period on account of his health. He returned to Scotland and died at Creetown on August 18, 1925.

He was married in 1900 to Augusta Mildred Goslin of London, England. He is survived by his wife, one daughter, Barbara, a son, George, four brothers and two sisters, two of whom are Mr. Murdo Gibson and Mrs. John MacLeod of Duluth.

DR. E. F. CONYNGHAM

News has been received of the death of Dr. E. F. Conyngham of Underwood, which occurred Saturday, February 13, at the University Hospital, Minneapolis.

Dr. Conyngham was born in the state of Missouri, May 8, 1865, being sixty years old at the time of his death. He was a graduate of the Medical School of the University of Minnesota, of the class of 1886.

Dr. Conyngham had been practicing at Underwood since 1922. He was an honorary member of the Park Region District Medical Society.

Dr. Conyngham is survived by a daughter, Katheryn, a son, Edward, and a sister.

REPORTS AND ANNOUCEMENTS OF SOCIETIES

LYMANHURST STAFF MEETING

At the regular monthly meeting of the medical staff of the Lymanhurst School for Tuberculous Children the following program will be presented at 7 o'clock Tuesday evening, March 23, 1926, at the Lymanhurst School, 1800 Chicago Avenue, Minneapolis:

"Roentgenologic Observation of Unusual Pulmonary Conditions." Dr. Leo Rigler.

"Some Considerations in the Prevention of Heart Disease." Dr. M. H. Nathanson.

"The Acoustics of the Bronchial Breath Sounds, and Its Application to the Phenomena of Auscultation as Heard in Lobar Pneumonia." Dr. George Fahr.

"Employment of Operations to Reduce Disability Rather Than to Postpone Death." Dr. John L. Yates of Milwaukee.

All persons interested in tuberculosis are invited to attend these meetings and participate in the discussions.

UPPER MISSISSIPPI MEDICAL SOCIETY

At the last annual meeting of the Upper Mississippi Medical Society, held January 30, 1926, the society went on record as being in favor of raising the state dues to such amount as is necessary not to exceed $15.

Dr. H. M. Johnson, president of the State Association, attended this meeting.

OF GENERAL INTEREST

Dr. J. T. Schlesselman of the Mankato Clinic is spending three months abroad, doing post-graduate work in eye, ear, nose and throat diseases, in Vienna.

Dr. Henning F. Wiese, formerly with the Sivertsen Clinic, Minneapolis, has opened his own offices at 701 Physicians and Surgeons Building, Minneapolis.

Dr. Macnider Wetherby has announced the opening of offices in the La Salle Building, Minneapolis, for the practice of internal medicine and diagnosis.

Dr. H. G. Wood of the St. Paul Clinic, St. Paul, returned to the Mayo Clinic, Rochester, the first of this month, where he will be associated with the medical department.

Dr. J. H. Beaty of St. Cloud is doing post-graduate work in gynecology and obstetrics at Tulane University in New Orleans. He expects to return about the first of April.

"Physical Therapeutics" is the name which has been selected for the former "American Journal of Electro-Therapeutics and Radiology," published in Baltimore, Maryland. The change in names became effective with the February number.

The Society of Experimental Biology and Medicine meets the first Wednesday of each month in Millard Hall, and the secretary, Dr. F. H. Scott, will be pleased to send programs of each meeting to any physician in the Twin Cities who asks for it.

The Physiological-Pharmacological Seminar of the Medical School meets each Tuesday during the school year in the Faculty Room, Millard Hall, at 12:30. Coffee is served and members bring their own sandwiches. Members of the medical profession will be welcome at these meetings.

Dr. L. M. Lowe has disposed of his practice at Glyndon, where he has been located for the past twenty years and is now engaged in post-graduate study at Tulane University, New Orleans. Dr. Lowe expects to return to Minnesota in the spring, when he will engage in general practice in Minneapolis.

On March 30, at 4:30 P. M., in the Chemistry Auditorium, University of Minnesota, Dr. E. F. Burton of the Department of Physics of Toronto University will lecture on "The Physics of the Ultra Microscope; Its Structure and Use and the Optical Properties of Suspended Particles and Colloidal Cells." This is a lecture in the colloid series conducted by the Graduate School for which noted authorities are brought to the University.

STATE HEALTH DEPARTMENT TO SUPPLY DIPHTHERIA TOXIN-ANTITOXIN AND MATERIAL FOR THE SCHICK TEST FREE OF CHARGE

The Minnesota State Sanitary Conference requested the State Health Department to secure toxin-antitoxin and material for the Schick test for free distribution throughout the state in the line of the distribution of diphtheria antitoxin.

The statistics for the past seven years show that no further reduction of diphtheria cases and deaths may be expected until toxin-antitoxin is generally used.

MINNESOTA'S DIPHTHERIA 1918-1924

28,852 cases; 1,667 deaths; fatality rate, 5.77 per cent.

	Cases	Percentage of All Cases	Deaths	Percentage of All Deaths	Percentage Fatality
Under 1 yr.	355	1.23	53	3.1	14.92
*Under 5 yrs....	4,220	14.63	610	36.63	14.45
5-9 yrs.	8,210	28.46	511	30.69	6.22
10-14 yrs.	5,489	19.02	215	12.91	3.91
15-19 yrs.	2,649	9.18	87	5.23	3.28
All others	8,284	28.71	244	14.54	2.94

*Includes group "Under 1 yr."

Year	Cases	Deaths	Fatality Rate	Mortality Rate per 100,000
1918	3,674	282	7.7	12.3
1919	4,541	302	6.6	12.9
1920	3,616	243	6.7	10.3
1921	4,380	220	5.0	9.03
1922	4,270	192	4.5	7.74
1923	4,430	210	4.7	8.40
1924	3,941	218	5.8	8.61

The Department of Administration and Finance is now making arrangements for supplying toxin-antitoxin and material for the Schick test to be distributed free of charge by the State Health Department.

Dr. H. M. Johnson, president of the State Medical Society, had the whole proposition thoroughly discussed by the proper committees of the association, who enthusiastically indorsed the State Board's program. In counties where no organized campaigns for toxin-antitoxin work have been started, the matter will be taken up with the county and district medical societies by the State Board of Health. The secretaries of the county and district societies will receive a letter shortly giving the complete outline of the program discussed with Dr. Johnson.

The Board feels that the supply of toxin-antitoxin should be made available not only to health departments and school boards who will conduct organized work in the schools, including, of course, children under school age, but also to physicians for use in their private practice. It is obvious that the family physician is in a position to reach the very young children who have the greatest susceptibility to diphtheria. The fact that during the past seven years nearly 37 per cent of all the deaths from diphtheria have occurred in children under five years of age emphasizes the part the family physician will play in the eradication of diphtheria through toxin-antitoxin immunization.

MEDICAL STUDY TOUR TO EUROPE

The Travel Study Club of American Physicians, founded at the London International Medical Congress of 1913, is announcing plans for its 1926 Study Tour. Sailing from New York on June 12, the party will visit clinics and medical institutions in the medical centers of Oslo (Christiania), Stockholm, Copenhagen (optional to Berlin and Munich), Cologne, Heidelberg, Strasbourg, Berne, Zurich, Leysin, Geneva, Paris and London, returning on August 8. Dr. Louis L. Seaman of New York is president, Drs. Fred H. Albee of New York, Edward B. Heckel of Pittsburgh, John P. Lord of Omaha, vice presidents. Physicians in good standing, to the limit of fifty, are invited to participate in this tour, and the secretary, Dr. Richard Kovacs, 223 East 68th Street, New York City, will supply any further information desired.

THE ANEMIAS DUE TO RADIOACTIVE SUBSTANCES

Reports have been published on the dangers of radioactive substances and warn against subtle menaces that represent practically a heretofore unrecognized form of occupational poisoning. These reports bring out that the ingestion of radioactive substances may act as irritants to the adjacent erythroblastic and leukoblastic centers and may produce a severe anemia and stimulate pernicious anemias of the regenerative and aplastic types. The demonstrated cell-destructive potency of radioactive substances and the unsuspected late effects which they may initiate should serve as a vigorous warning to all who promote radioactivity as a therapeutic measure. (Jour. A. M. A., Jan. 9, 1926, p. 121.)

NEW AND NON-OFFICIAL REMEDIES

TRUTH ABOUT MEDICINE

Special Pertussis Vaccine.—A pertussis bacillus vaccine (New and Non-official Remedies, 1925, p. 353) marketed in 5 c.c. vials. Cutter Laboratory, Berkeley, Cal.

Coco-Quinine.—Each 100 c.c. contains quinine sulphate 2.19 gm. (10 grains per fluid ounce), suspended in a syrup flavored with chocolate, yerba santa and vanillin, and containing sodium benzoate, 0.18 gm. per 100 c.c., and alcohol, 4 per cent. Eli Lilly & Co., Indianapolis.

Concentrated Culture of Bacillus Adicophilus-P. D. L.—A milk culture of *Bacillus acidophilus* supplied in vials containing 8 c.c. It contains not less than 300 million viable organisms *(B. acidophilus)* per c.c. at the time of sale. For a discussion of actions and uses, see Lactic Acid-Producing Organisms and Preparations (New and Non-official Remedies, 1925, p. 191). Physicians Diagnostic Laboratories, Berkeley, Cal. (Jour. A. M. A., Jan. 2, 1926, p. 37.)

Scarlet Fever Streptococcus Antitoxin Concentrated.—A scarlet fever streptococcus antitoxin (Jour. A. M. A., May 2, 1925, p. 1338) prepared by the method of Drs. Dick by license of the Scarlet Fever Committee, Inc. It is marketed in packages of one syringe containing 6 c.c. (prophylactic dose) and in packages of one syringe containing 12 c.c. (therapeutic dose), E. R. Squibb & Sons, New York.

Scarlet Fever Immunity Test.—The toxin of the hemolytic streptococcus of scarlet fever is used to determine those persons who are susceptible to scarlet fever. The toxin is first standardized on human beings and diluted so that 0.1 c.c. represents a skin test dose. The test dose is injected intracutaneously on the forearm and the degree of susceptibility is determined at the end of from 22 to 24 hours. The toxin is used also for active immunization. For this purpose it is injected subcutaneously at weekly intervals; from three to five doses of increasing strength are given.

Scarlet Fever Streptococcus Toxin for Dick Test-Squibb.—It is prepared by the method of Drs. Dick by license of the Scarlet Fever Committee, Inc. Marketed in packages of one vial containing sufficient toxin for ten tests; in packages of one vial containing sufficient toxin for 100 tests. E. R. Squibb & Sons, New York.

Scarlet Fever Streptococcus Toxin-Squibb.—It is prepared by the method of Drs. Dick by license of the Scarlet Fever Committee, Inc. Marketed in packages of five vials of toxin containing increasing doses; in packages of fifty vials, representing ten immunizations. E. R. Squibb & Sons, New York.

Sulpharsphenamine-Mallinckrodt.—A brand of sulpharsphenamine (New and Non-official Remedies, 1925, p. 55). It is marketed in ampules containing, respectively, 0.1, 0.2, 0.3, 0.4, 0.5 and 0.6 gm. Mallinckrodt Chemical Works, St. Louis. (Jour. A. M. A., Jan. 16, 1926, 199.)

PROPAGANDA FOR REFORM

Trepol and Neotrepol Not Acceptable for M. N. R.—The Council on Pharmacy and Chemistry reports that Trepol and Neotrepol, bismuth preparations for use in the treatment of syphilis, marketed by the Anglo-French Drug Co., are not acceptable for New and Non-official Remedies. Trepol, offered in the form of ampules claimed to contain basic tartrobismuthate of potassium and sodium, was rejected because the product does not represent a "tartrobismuthate of potassium and sodium" but is instead substantially a basic bismuth tartrate, and because no adequate tests for the control of its identity and uniformity are furnished. Neotrepol, supplied in the form of ampules containing metallic bismuth in suspension, was rejected because the amount of active ingredient claimed to be contained in the ampules is not in accord with the amount declared to be present. (Jour. A. M. A., Jan. 9, 1925, p. 135.)

Some More Medical Frauds.—The postal authorities have recently barred a piece of asthma cure quackery and two lost manhood fakes from the use of the mails. The first is the Asthma-Tab Laboratories, Inc., of Kansas City, Mo., which exploited a product to the public, shown by the A. M. A. Chemical Laboratory to be essentially potassium iodide and arsenic trioxide. The two lost manhood concerns were Hart & Co., which put out a device called the Perfection Developer, and B. & V. S. Manufacturing Co., which exploited the "Burt Vacuum Tube." (Jour. A. M. A., Jan. 16, 1926, p. 218.)

Vitalait Starter Omitted from N. N. R.—The Council on Pharmacy and Chemistry announces that Vitalait Starter of the Vitalait Laboratory, Newton Centre, Mass., has been omitted from New and Non-official Remedies because the preparation was used as a means of advertising an unacceptable preparation. (Jour. A. M. A., Jan. 23, 1926, p. 294.)

PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

Meeting November 12, 1925

The Minnesota Academy of Medicine held its regular monthly meeting at the Hotel Kahler, Rochester, Minnesota, on Thursday evening, November 12, 1925.

The meeting was called to order by the President, H. L. Ulrich. There were 45 members and 22 visitors present.

The minutes of the October meeting were read and approved.

President Ulrich introduced the speakers and called upon Dr. John Fulton, the first president of the Academy, who opened the program.

DR. FULTON: I thank our President, Dr. Ulrich, for giving me the opportunity to express my very keen appreciation, and I know I am expressing similar sentiment for every member of the Academy to Dr. Judd for the invitation and the honor which he has conferred upon the Min-

nesota Academy of Medicine to meet with this magnificent Clinic, one of the greatest in the world.

This Society was organized about forty years ago, in the West Hotel, Minneapolis. The original membership consisted of twenty members each, from St. Paul and Minneapolis, thus demonstrating that the medical profession of the Twin Cities was harmonious then, as they are now, and practice together in peace and happiness, without the exercise of continuous jealousies.

The history of this Academy has recently been written in a very interesting, thorough and satisfactory way by Dr. Arthur S. Hamilton and published by Dr. Jones in a recent number of The Journal-Lancet, but as I have already said to our presiding officer, we are here to listen to this splendid program. It is dangerous to ask a man of my age to make an after-dinner speech on account of the temptation to reminisce, which might take up all the time allotted to us, so safety consists in commencing immediately with the program.

The scientific program consisted of the following reports:

1. Dr. H. S. Plummer—The Use of Iodine in the Treatment of Exophthalmic Goitre.
2. Dr. W. E. Sistrunk—Operation for Thyroglossal Duct Cyst. Discussion by Dr. Arnold Schwyzer, St. Paul.
3. Dr. Chas. Sheard and Dr. J. L. Bollman—Studies in Liver Function. (With lantern slide demonstration.) Discussion by Dr. Hilding Berglund of Minneapolis, and Dr. L. G. Rowntree of Rochester.
4. Dr. E. C. Rosenow—Studies in Poliomyelitis.
5. Dr. E. C. Kendall—Progress in Study of Thyroxin. (With lantern slide demonstration.)
6. Dr. W. L. Benedict—The Ophthalmoscopy of Clifford Allbutt.

On motion meeting adjourned.

JOHN E. HYNES, M.D.,
Secretary.

Meeting of December 9, 1925

The Minnesota Academy of Medicine held its regular monthly meeting at the Town and Country Club on Wednesday evening, December 9, 1925, at 8 o'clock. There were 38 members and 1 visitor present.

The meeting was called to order by the Vice President, Dr. F. E. Burch.

Dr. L. E. Daugherty (St. Paul) reported two cases, as follows:

1. A case of rupture of the tendon of the long head of the biceps muscle.

G. L., section laborer, married, 37 years of age. On November 2, 1925, he lifted a big piece of ice. The forearms were flexed at a right angle. He felt a sudden acute pain in the region of the right shoulder and upper arm. He continued working but the pain in the right shoulder persisted and he noticed some deformity of the right biceps muscle. He stated that the right arm was weaker than the left, particularly in the motion of flexion.

Examination showed a well-developed man. When the right arm was flexed there was a noticeable deformity of the biceps muscle. A hard indurated area about two inches long could be felt in the outer and upper margin of the muscle.

Operation: An incision was made over the anterior part of the upper arm. The tendon sheath was opened, and the tendon was found turned around in the sheath so that the injured end was near the muscle. It seemed to have been torn from its point of insertion. By splitting the pectoral muscle in front of the deltoid, the coracoid process was exposed. The tendon of the long head was passed through the short head of the biceps and sutured to it and was then attached to the coracoid process.

This method copies the one used by Dr. E. L. Gilcreest in the last transactions of the Western Surgical Association.

2. A case of tuberculous empyema apparently cured following thoracoplasty.

J. B., female, age 22 years. Father died of "nephritis." Mother living and well. Three brothers living and well; one brother died of "heart disease"; one brother accidentally killed. Three sisters living and well. No family history of tuberculosis.

Past history: Patient was always well until the summer of 1919, when she began to tire easily. In April, 1922, shortly after a pulmonary hemorrhage, she was admitted to the service of Dr. Geer at the Ancker Hospital. At that time an advanced tuberculosis of the upper right lung was found and the sputum contained numerous tubercle bacilli.

On May 11, 1922, artificial pneumothorax was induced and a good collapse was obtained followed by relief of symptoms. There was a slow gain in weight and the sputum became negative.

In December, 1922, there was evidence of an effusion in the right chest which increased in volume. There were no symptoms at that time and the sputum remained negative.

In July, 1923, in spite of the effusion in the right chest, there was no temperature and she was allowed to go home for a vacation. The sputum was still negative for tubercle bacilli.

In November, 1923, there was a return of daily temperature and one day, while eating candy, a severe choking and coughing spell raised a cupful of sweetish purulent material.

On March 24, 1924, it was necessary for her to return to the hospital and a right pyothorax with a bronchial fistula was found. On aspiration, the fluid contained tubercle bacilli but no other organisms. Repeated aspirations and injections of formalin and methylene blue, by Dr. Geer, did not affect the effusion and the bronchial fistula remained open.

I first examined this girl in October, 1924, when the above condition was present. There was some cough; the general condition was fair; weight about 96 pounds, and temperature 100. An *x*-ray of the chest showed a complete collapse of the right lung with considerable fluid in the right thoracic cavity.

On October 30, 1924, under local and gas anesthesia, the first stage of an extra-pleural thoracoplasty was done and the 10th, 9th, 8th, 7th, 6th, and 5th ribs were resected. The patient made a good recovery, and on November 15, 1924, the second stage of a thoracoplasty was performed and the 4th, 3rd, 2nd, and 1st ribs were resected. Again there was

an uneventful recovery and an *x*-ray of the chest showed about a 50 per cent reduction of the right chest cavity.

In March, 1925, the bronchial fistula had closed. The lung gradually expanded and filled the partially obliterated thoracic space.

On April 30, 1925, the parietal and visceral pleura were in apposition and there was no fluid present.

At a recent examination, October, 1925, there was no temperature or cough; her weight was about 121 pounds, and clinically she was well. This girl is as active as any normal individual and recently applied for training at the school for nurses at Pokegama.

DISCUSSION

DR. E. K. GEER (St. Paul) (by invitation): If one looks over the literature on artificial pneumothorax he will find the incidence of pleural effusions in collapse cases varying from 40 to 100 per cent. Five to 15 per cent of these effusions become purulent, with only tubercle bacilli found in them. If he looks for the treatment of these purulent effusions he meets with disappointment because the treatment is mentioned in anything but optimistic tones. Aspiration is mentioned and usually that is all.

From my experience in a rather large series of pneumothorax cases, and I have treated about 110, I noted serous effusion in practically all, with 10 per cent becoming purulent. In attempting to clear up these tuberculous empyemata, I ran through the literature rather thoroughly and found aspiration advised as a palliative measure. By chance I ran across a statement of John B. Murphy that 2 per cent formalin in glycerin might clear up some of these stubborn empyemata.

Two of my tuberculous empyema cases cleared up by repeated aspirations; two others by formalin injections, and two by thoracoplasty. This girl, whose case has been presented to you, had a bronchial fistula for about a year without getting a pleural pyogenic infection. The whole thing responded so nicely to thoracoplasty that I think we will resort more frequently to thoracoplasty in similar cases. She did have a severe type of pulmonary tuberculosis when she came under our observation. The pulmonary lesion was controlled by injections of air. Then she developed a pleural tuberculosis which was more difficult to control. I think this is a very brilliant example of what thoracoplasty will do.

DR. DAUGHERTY: I think this problem of tuberculous empyema is a very great one and if we can save even a few of these patients with a thoracoplasty it is worth while.

DR. W. P. LARSON (Minneapolis) read a paper entitled "The Value of Surface Tension Depressants in Detoxifying Bacterial Toxins for Immunization."

DISCUSSION

DR. F. W. SCHLUTZ: The work and results of Dr. Larson are very impressive. It could easily come to pass that his results will have a revolutionary bearing upon the contagious disease problem. The manner in which he can make diphtheria and scarlet fever immunization practically safe and absolutely certain is truly remarkable. Few of us here now probably realize what far-reaching effects this may have. We have tried his methods in the University Hospital and in the out-patient department, and can entirely confirm the results presented here tonight.

I am firmly convinced that Dr. Larson's work represents a tremendous advance over the results obtained in Chicago and New York.

I would like to ask Dr. Larson whether there is any mechanism of accurately testing out or determining the point where the toxin has the maximal effect. It seems to me, from a technical standpoint, it would be a good thing to have some mechanism of standardization.

DR. J. T. CHRISTISON: Dr. Larson has referred to the work done by my associate, Dr. Colby, and as I have had some part in this it may be of interest to you to know that we have about a thousand cases thus far. We began by using the material that the Doctors Dick gave us. The greatest objection to that was that the children had to have three injections. Then Dr. Larson announced that his soluble toxin would probably do away with the three injections and we began using that toxin. The results he has given you are unquestionably the results we are all getting from that type of material. There has been one case following the immunization treatment that was given to the children in the school Dr. Larson mentioned. Those children, theoretically, ought to have had a lot more scarlet fever; therefore, there must be some particular virtue in this type of immunization. In those instances where one child had scarlet fever and the rest of the family have been immunized, no other cases of scarlet fever have developed.

We have had only one case in which there was any apparent reaction and that was my own daughter, who is about 10 years old, and who gave a very positive reaction following a 4,000 skin test dose. There was no fever, and no discomfort, but she had a very apparent rash.

I am getting to the point where I say to the mothers that there is not now much excuse for people allowing their children to have scarlet fever or diphtheria. With the results we are geting, I think I am quite justified.

DR. J. F. HAMMOND: I would like to ask Dr. Larson how dangerous it really is to use the old method of inoculating against diphtheria. People are asking us as to the advisability of having their children inoculated. What is the danger of anaphylaxis in future treatment?

DR. A. SCHWYZER: Our sincere thanks are due Dr. Larson for having brought this observation before the Academy. It seems to me, as I listened to this paper, that we have here a momentous finding; that we have something of enormous value. As the father of three children who not long ago had injections against diphtheria (the serum injection), I am quite impressed with the value of having an immunization that does not contain horse serum. When you hear that you could previously give 125 of certain units and now can give 3,000, the first question that comes to mind is, "Isn't it that this toxin undergoes a chemical change with the soap?" It seems, however, that the toxin is not changed, but the process, as Dr. Larson explained it, consists simply of putting a soap layer around the molecules. Thus the toxin is only very gradually freed in the course of time in the body and is, therefore, acting for a long while. Dr. Larson could even precipitate the soap and free the active principle and again have the toxin

action. I think it would be very interesting if Dr. Larson would tell us how he explains the action of the soap and what the factor of reduction of the surface tension is doing in the physical sense.

I think we have listened to something that is of the highest importance and value.

DR. BURCH: I am sure I express the sentiments of the Academy in thanking Dr. Larson for coming before us and giving us this very original and valuable work he is doing.

DR. GEORGE E. FAHR (Minneapolis) read a paper entitled, "The Fatigue Factor in Cardiac Failure."

DISCUSSION

DR. J. G. CROSS: The term "heart failure" as often used as a cause of death is the "refuge of distressed diagnosticians," to quote from Osler's remark in another connection. However, in its true sense, as used by Dr. Fahr to describe the failing function of the mechanism of the heart to maintain circulation, it covers almost the entire field of heart disease, since such failure may come about as the result of valve, muscle, or nerve defect. Dr. Fahr has presented clearly the sequence of events which take place in the heart affected by myocardial trouble of a non-infectious character, as distinguished from inflammatory infections of the cardiac tissue. He states that heart failure is always the result of increase in the intracardiac (blood) pressure. This is not so far from the teaching of thirty years ago of "back pressure" and failure of one chamber after the other. At that time we were not so familiar with the toxic causes of muscle degeneration nor with the disturbances of conduction of the impulses. Undoubtedly, Dr. Fahr's meaning is that the increase in pressure is an event in the course of a failing heart, itself the result of a previous defect. The essayist, of course, did not pretend to enumerate all of the factors leading to heart failure or myocardial failure. That would be too large a task. He wisely chose to limit the discussion to the series of events leading up to the incompetent heart muscle.

It would be an error to believe that the problems concerned in heart failure are now entirely understood. We are still speculating on the cause of some heart phenomena, the recognition of which is not only difficult during life but not always cleared up at autopsy. It has been supposed for a generation that Prof. Welch's explanation of recurrent attacks of pulmonary edema, on the basis of a disproportion between the power of the right and left heart, was correct. This was propounded when he was a student with Conheim. Prof. Welch recently told me that this explanation did not account for many cases of such trouble, nor would it explain why so few patients with marked disease of one chamber of the heart escape attacks of lung edema. This is another instance of the abandonment of the old "backing up" idea.

We are indebted to Dr. Fahr for his sharp distinction between infectious myocardial troubles and toxic muscle defects which are purely physical and toxic.

DR. J. F. HAMMOND: Dr. Fahr spoke of the length of time it took for the increase in the size of the heart in hypertrophy. I would like to ask Dr. Fahr if, in the progress of a case when it is recovering clinically, he can see any appreciable decrease and how much in the size of the heart. One heart was recently reported to have been 3 inches too large and after ten days' treatment it was 2 inches smaller. I would like to ask him also how long, during treatment, he thinks it is well for these patients to stay in bed and if it is good for them to have absolute rest or some exercise if they have vague heart symptoms such as pains, etc.

DR. J. S. GILFILLAN: I agree with Dr. Fahr on almost everything he said, especially on leaving the teeth in. Why the failure of these hearts takes place at a certain time, one cannot always tell. I think that the name myocarditis is used a great deal now just from force of habit and that a great many people who use it do not mean myocarditis, or they do not mean by that that there is an inflammatory condition in the heart muscle. We use it now as a joke. But that is one reason for the persistence of the term. I think Dr. Fahr is right on the importance of rest in these cases. That really is the great thing for them. If I had to do without either digitalis or morphin I would rather do without the digitalis in many cases, as they can't get rest without morphin. Both are important, of course, but one is of greater importance than the other.

DR. E. L. GARDNER: I agree absolutely with Dr. Fahr. We might discuss the relation of focal infection or any other toxemia, affecting the body as a whole, which indirectly produces a premature breakdown of cardiac compensation. I think that it is only in an indirect way that focal infection has any relation to cardiac failure. I know of no evidence which can be obtained from a pathological examination of the heart which indicates inflammatory changes—a true myocarditis; on the other hand it is not safe to assume that focal infection or other toxemias do not impair myocardial function just because we cannot demonstrate structural damage under the microscope; clinical evidence, unreliable as it may often be, is to the contrary.

I agree with Dr. Gilfillan that much of the argument arises from the use of a faulty terminology. The term "myocarditis" should be reserved for conditions due to true inflammatory changes in the myocardium and not applied to all myocardial weakness regardless of cause and positive demonstrable structural damage. The clinician has carelessly used the term to include any myocardial failure; such terms as "cardiac sclerosis," "toxic myocardium," "weak myocardium," etc., should be used, remembering all the time that the heart alone is not singled out, but is a symptom of a general body dysfunction. In such a sense I believe we would all agree to remove any toxic or nutritional cause affecting the body, including the myocardium. It is, therefore, very important to maintain the patient's good health to prevent cardio-circulatory breakdown, especially where there has been some former mechanical damage such as myocarditis, valvular disease, or pericardial adhesions.

Upon motion the meeting adjourned.

JOHN E. HYNES, M.D.,
Secretary.

CASE REPORTS

Members are requested to report interesting and unusual cases for publication in this department. Many cases reported at hospital staff meetings and similar meetings are very instructive and worthy of publication.

TWO INSTANCES OF PERFORATION OF THE HEART FOLLOWING NON-PERFORATING CHEST INJURY*

E. L. Tuohy, M.D., and G. Berdez, M.D.
Duluth, Minn.

Case 1.—E. E. Aged eleven years. Came to coroner's autopsy at Duluth, Minn., June 10, 1925.

The following clinical data were elicited by the intern at St. Mary's Hospital, Dr. Bakkila. The pathological notes and findings were made by Dr. G. Berdez, pathologist at St. Mary's Hospital.

Clinical Data: The child had been struck by an auto a few minutes before being brought to the hospital.

On entrance he was unconscious, the skin cold and clammy, and in very obvious shock. There was a restlessness, exhibited by constant movement of the arms and head. The pulse was found very rapid—the heart tones scarcely audible. Normal reflexes looked for were present, and no abnormal reflexes were found. There was no external injury whatever, except a slight abrasion near one ankle, and over one side of the face. Two hours later the pulse had slowed down somewhat, but was still imperceptible, and the heart tones were distant and obscure. Involuntary bowel movements occurred. He died about three hours after entering the hospital.

It was stated on the record that death occurred about four hours after the accident.

Autopsy Data: The only external injuries noted on careful examination of the body were slight abrasions on the face, neck, the upper right arm, and near the ankles.

On opening the chest the pericardial cavity was found distended with fluid blood. The parietal pericardium was found intact. Marked ecchymosis was found under the visceral serosa, near the apex of the heart, and a small perforation was found at the apex, just admitting a moderate sized match into the cavity of the left ventricle. There was no abnormality whatever noted in the heart otherwise, either as to the valves or the heart muscle. A small amount of bloody fluid was found in the left pleural cavity, and there was evidence of some subserous interlobular hemorrhage.

Case 2.—R. A. C. Aged 63 years. Came to coroner's autopsy at Duluth, Minn., Oct. 5, 1925.

The following notes were elicited and assembled by Dr. G. Berdez, pathologist at St. Mary's Hospital, Duluth.

Clinical Data: Unfortunately, there had been no doctor's examination whatever. However, the man's son, and other members of his family, recite the following: Two weeks prior to his death he suffered an injury in his automobile, in which he was thrown, with a good deal of force, against the steering wheel. From that time on he did not feel well. His symptoms were chiefly those of pain and distress in his chest, a feeling of fullness and discomfort in the upper abdomen, and he is said to have vomited nearly every day. It is apparent, nevertheless, that he went on about his way, and, so far as is known, did not consult a physician. There was no external precordial injury or abrasion.

He died suddenly while sitting in his seat in a movie theatre—attending a performance of "The Freshman" (with Harold Lloyd!).

Pathological Data: There was a rupture, about one inch long, through the wall of the left ventricle, the pericardium was full of blood, some of it partially clotted.

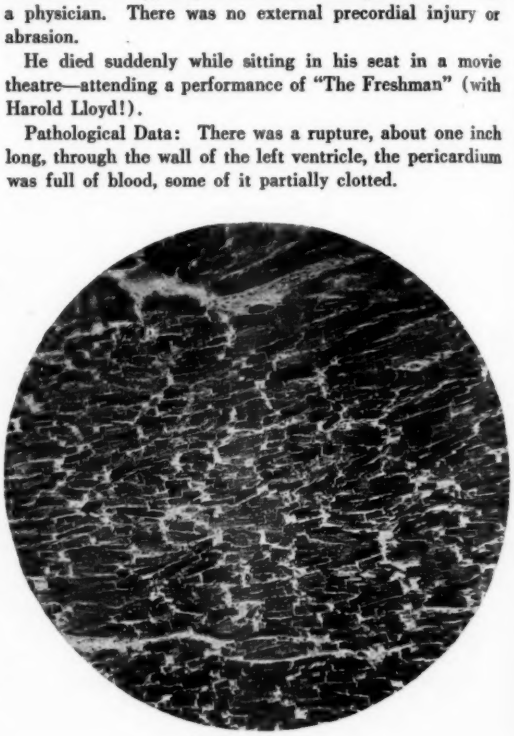

Fig. 1

A careful examination, however, of the site of the rupture, indicated clearly previous evidence of trauma, some tearing, and evidence of muscle fibre fragmentation, recent scar formation, and moderate hemorrhage. These features, tending to establish this local injury (probably when he was thrown against the steering wheel of his car), may be briefly summarized as follows:

1. The site of the rupture was described by the pathologist as "like a repair wound in the second week."

2. There was evidence of small old hemorrhage into the pericardium and into the fragmented muscle bundle. Red blood cells could be seen in the granulation tissue still showing their form and hazy outline. There were a few pigment granules. (Hemosiderin forms within about seven days after hemorrhage into the tissue.)

3. The recent granulation tissue itself was sharply limited and circumscribed to the area of the ultimate rupture.

*From the Pathological Laboratory and the Clinical Records, St. Mary's Hospital, Duluth, Minnesota.

*Hirshfelder: "Diseases of the Heart and Aorta." Lippincott, 1918.

4. The marked fragmentation of the fibres of the myocardium was found nowhere else, on careful study of the heart.

It may be stated that he had very marked arteriosclerosis, and the left coronary artery somewhat narrowed, the right not to such a degree. The base of the aorta showed very advanced atheroma.

Comment: In contrast to the young boy of 11 years, the factors of senility, general atherosclerosis and interference with the nutrition of the heart enter, and tend to complicate the clinical sequences. The evidence of injury to the site of ultimate rupture of the ventricle wall, coming on two weeks previously, is quite conclusive. Would this have happened if the heart muscle had been normal? It is well known, of course, that rupture of the heart not uncommonly follows partial or total coronary occlusion.

The events following upon coronary blockage and infarction, with anemic necrosis and myomalacia cordis, are well known. However, the picture here was totally different, and for that reason carries great interest.

To further elucidate the structural changes in the man 63 years old, three photomicrographs are hereby presented. Figure 1 shows the field under lower power, illustrating the nearby and regional "fragmentation." Figure 2 shows the low power within the area itself of "recent scar formation and moderate hemorrhage." Figure 3 is a higher magnification in portions of the same area, showing the adjacent muscle fibres and with them the newly forming connective tissue cells.

Fig. 2

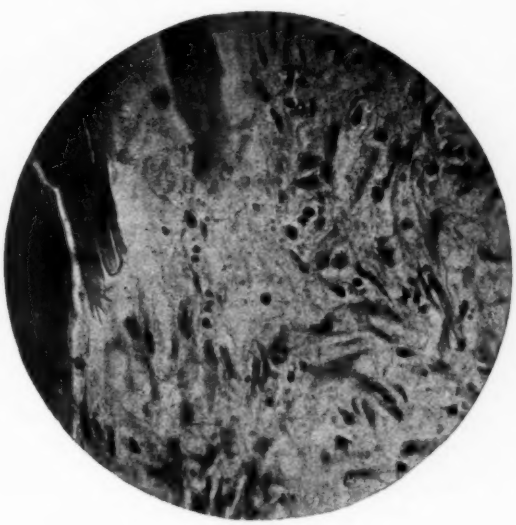

Fig. 3

Literature: Hirshfelder* has the best succinct data and references upon "non-perforating injuries" of the heart that have come to our attention in the English literature available.

Blancard, in 1688, recorded the first instance in a forty-five-year-old man who had been run over by a heavy cart.

Bernstein, in 1896, collected from the literature 126 cases. Forty-two of these had come to autopsy, and a list of the lesions found were catalogued.

G. Fisher (reference in Hirshfelder's book) gave a list of the sources of trauma resulting in cardiac rupture without external injury. In this list, falls from various heights and injuries from heavy carts or wagons comprised by far the largest number.

One of us (Dr. Berdez), in a casual review of the German literature, has uncovered the following references:

Dr. C. Thiem, "Handbuch der Unfallheilkunde," Second Edition, 1910, Vol. II, Part 2, p. 237, considers this subject both in instances where fatty change and brown atrophy had preceded traumatic rupture, and also in others, where the heart had up to the time of the accident been in good condition. A definite case of the latter is mentioned where autopsy showed a rupture in the ventricle and a tear 4 cm. long in the interventricular septum. This followed a kick from a shod horse. He refers also to the cases mentioned by Fisher, and mentions an athlete, 25 years old, who died one and one-half hours after a severe blow in the region of the stomach. The autopsy showed a tear in the wall of the right ventricle, 11 cm. long. The ventricle wall microscopically showed only some fatty change.

Von Bergman instances an extensive tearing of the heart, without any external injury to the thorax, in a young man injured between two railway cars.

Kugel, "Ein fall von Herzruptur." Praeger med. Wochenschrift, 1909-21: This interesting case (a 44-year-old man) was injured while loading large, heavy bales. One fell back upon him, injuring him, obviously internally. After treatment and stimulants he recovered, but the following day felt badly and was much agitated, and had severe pain

in the region of the liver. He died forty-two hours after the beginning of this pain. Autopsy showed a rupture of the right auricle.

Greig, "A Case of Rupture of the Left Auricle of the Heart," Lancet, October 31, 1908. In this instance, after great over-exertion, a 24-year-old patient collapsed. Despite the youth of this patient and the presumptive reasonable integrity of the heart, autopsy showed a rupture of the left auricle.

Ebbinghaus, "Betrag zur Lehre von den traumatischen Erkrankungen des Herzens. Ein fall von subcutaner traumatischer Herzruptur mid tod am 9 ten Tage." Deutsche Zeitschrift für Chirurgie, 1903, Bd. 56, instances a case in which the histological findings were very similar to the findings in our second case.

PRIMARY PNEUMOCOCCIC PERITONITIS IN CHILDREN: REPORT OF CASE

HARRY OERTING, M.D.
St. Paul

Primary pneumococcic peritonitis is one of the most serious abdominal conditions we have to deal with in children and has a mortality of almost 100 per cent. Strictly speaking, the condition is not entirely one of childhood, but the incidence is so much greater in children than it can be considered primarily a disease of childhood.

McCartney and Frazier, of Edinburgh, believe that primary pneumococcic peritonitis is a disease peculiar to the female sex and contend that the infection enters through the genitals. Of the fifty-six cases reported by them no primary case was seen in the male. However, authentic cases of primary pneumococcus peritonitis in the male have been reported and the infection in these cases must have been by the blood stream or the gastrointestinal tract. Pneumococcic peritonitis is a rare complication of pneumonia and is then considered a secondary pneumococcic peritonitis and will not be considered here.

There are two recognized types of primary pneumococcic peritonitis—the localized and generalized—and the clinical picture differs according to type. The localized or circumscribed form has an acute onset with pain over the abdomen, fever, profuse vomiting and severe diarrhea. The symptoms gradually improve and in a week or ten days the process becomes encysted with abscess formation. If not relieved surgically the localized abscess usually ruptures at the umbilicus. Rarely it may rupture into the bladder, intestine or vagina. The diffuse form is ushered in with high fever, intense abdominal pain, delirium, prostration, persistent vomiting and profuse diarrhea with or without blood. The abdomen usually shows distension and some rigidity.

These cases are usually diagnosed acute perforating appendicitis with general peritonitis. However, the history of onset and subsequent events should place us on our guard and especially when the examination shows a patient prostrated beyond all reason considering the amount of abdominal distension and rigidity. The history of acute onset followed by vomiting and diarrhea is not characteristic of appendicitis with acute peritonitis.

The consensus of opinion as regards treatment is diagnosis at the earliest possible moment with immediate operation and adequate drainage.

Case Report.—E. G., a girl, aged 5, was admitted to St. Luke's Hospital on Dec. 3, 1925. The mother, father, brother, sister and herself had just recovered from an epidemic cold with fever, sore throat and cough of two weeks' duration. The afternoon of December 2 the child complained of pain in the lower abdominal region. She was seen by her physician and in the absence of definite physical findings it was considered a slight stomach upset from the cold she had been having. During the night she was very restless and at 4 A. M. became acutely ill with a severe pain over the entire abdomen but more especially in the lower quadrants. The child vomited several times and began to have a diarrhea. At 6 A. M. she was seen by the family physician, who diagnosed a general peritonitis and sent her to the hospital by automobile, a distance of about 15 miles. When seen at the hospital at 8 A. M. the abdomen was moderately distended, there was some rigidity over the entire abdomen, marked tenderness, and the child cried out when touchd. The temperature was 105.2, respiration 25, pulse 140, lungs clear, heart normal. Catheterized specimen of urine: sp. gr. 1,020, slight trace of albumen, sugar negative, sediment negative, acetone one plus on a basis of four, wbc 35,000 with 92 per cent polymorphonuclear cells.

A diagnosis of general peritonitis probably secondary to a ruptured appendix or a ruptured Meckel's diverticulum was made and immediate operation advised and accepted.

Operation: Under ether anesthesia the abdomen was opened by Dr. Ritchie along the right rectus border. When the peritoneum was opened there was a discharge of slightly yellowish flaky pus without any odor. The intestines were all inflamed and there was considerable fibrin present. The appendix was red and covered with fibrin at the tip and it was removed. No Meckel's diverticulum present. A diagnosis of pneumococcus peritonitis was made, cultures were taken and thorough drainage was provided for and the abdomen closed.

Laboratory findings: Cultures of the pus from the abdomen showed a pure strain of pneumococcus.

Subsequent course: Following the operation the temperature dropped to 103.4 and remained at this level and the child looked better for several days. Water was given by rectum and sparingly by mouth. Death occurred on Dec. 8, six days after onset.

STREPTOCOCCUS VACCINE AND MIXED STAPHYLOCOCCUS-ACNE VACCINE OMITTED FROM N. N. R.

The Council on Pharmacy and Chemistry announces that all streptococcus vaccines and all vaccine mixtures containing staphylococci and acne bacilli have been omitted from New and Non-official Remedies because experience with these preparations has not established the value which it was hoped they possessed and because recognized experts to whom the Council looks for help have concluded that these preparations have no field of usefulness. (Jour. A. M. A., Jan. 23, 1926, p. 294.)

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

PEDIATRICS

SUPERVISORS:

CHESTER A. STEWART,
LA SALLE BLDG., MINNEAPOLIS

ROY N. ANDREWS,
MANKATO CLINIC, MANKATO

EXPERIMENTAL STUDIES ON RICKETS: Andor de Bosanyi, M.D. (Amer. Jour. of Diseases of Children, December, 1925). The formation of normal bone is closely connected with a normal organic function of the bone marrow, and the disorders of calcification and ossification in rickets is closely connected with, or due to, pathologic changes in bone marrow function.

Bone is to be regarded as a physiologic unit—an organic system consisting of several kinds of tissues—and the growth of bone, that is, the formation of new bone, is dependent on an interaction of the functions of all these tissues.

Evidence has been obtained that the antirachitic factor in the healthy bone marrow of rats is a water-soluble protein.

Hemoglobin has a marked antirachitic effect when given in certain definite amounts. No rickets developed in rats which were put on diet No. 3143 containing 10 per cent of hemoglobin when they were 40 or 50 gm. in weight.

It seems logical to hypothecate a possible relationship between the globin of hemoglobin and the specific antirachitic protein produced by the bone marrow.

Certain proteins, presumably histons, with a high content of arginin, play an important rôle in the process of normal ossification. These substances are produced in the bone marrow.

Certain amins and physiologically similar alkaloids induce the healing of rickets presumably by stimulating the bone marrow.

Hemoglobin induces the healing of rickets not only in rats but also in children.

The primary event in the healing of the rickety process in the bone is its calcification due to local alterations in the rickety tissue. The changes in the chemical constitution of the blood serum, especially as regards the inorganic phosphorus, though they follow calcification of the bone very rapidly, are of a secondary nature and are sequelæ of the calcification.

R. N. ANDREWS, M.D.

THE CARBOHYDRATE METABOLISM OF THE MARANTIC INFANT: Frederick F. Tisdall, M.D., T. G. H. Drake, M.B., and Alan Brown, M.D. (Amer. Jour. of Diseases of Children, December, 1925). It is well recognized clinically, that of the three organic constituents of the food, namely, fat, carbohydrate and protein, the fat is more apt to cause digestive disturbances in marantic infants than either of the other two.

Hutchison, and Fleming and Hutchison, after extensive investigations and a critical review of the literature, came to the conclusion that "there is no defect in the power of atrophic infants to absorb fat."

In regard to protein absorption, Courtney, Utheim, Fleming and Hutchison and others have found no evidence of any defects in the ability of marantic infants to digest and absorb this constituent of the food. It is much more difficult to answer definitely as to the ability of the marantic infant to digest and absorb carbohydrate.

On account of the frequency with which marantic infants develop gastro-intestinal disturbances, Fleming believes that "failure of the gastro-intestinal tract to deal with carbohydrates satisfactorily is an important factor in the production (and maintenance) of atrophy."

In regard to the sugar tolerance curve obtained after the ingestion of glucose, Brown found that "the curve is identical in the normal and undernourished child." This would indicate that there is no defect in the ability of marantic infants to absorb carbohydrate.

There is no evidence that the marantic infant is not able to digest and absorb carbohydrate in a normal manner, provided no diarrhea is present. On the other hand, there is considerable indirect evidence that the marantic infant does digest and does absorb carbohydrate as readily as the normal infant.

It is quite apparent from a review of the literature and from the authors' figures that the concentration of the fasting blood sugar is lower in marantic infants than in normal infants.

The heat output per kilogram of active metabolic tissue is approximately the same with the marantic infant as with the normal infant.

It is evident that, calculated on the basis of the active metabolic tissue, the capacity of these marantic infants to utilize injected glucose is approximately the same as for the normal infant.

This consideration of the carbohydrate metabolism of marantic infants indicates that there is no derangement in the digestion and absorption of carbohydrate, and that glucose after it reaches the blood stream is removed at approximately the normal rate.

The author concludes, therefore, from the evidence available that the marantic infant absorbs and metabolizes carbohydrate in a normal manner, with the exception that it has not the stabilizing influence on the fasting blood sugar level of an adequate reserve of glycogen.

When feeding the marantic infant, it should be remembered that on the basis of the mass of active protoplasmic tissue, 70 calories per pound per day for the marantic infant is the exact equivalent of 45 calories per pound per day for the normal infant.

R. N. ANDREWS, M.D.

HYDROCEPHALUS: McKinn Marriott (Med. Clin. N. America, 9-45, July, 1925). In handling a case of hydrocephalus the first step is to determine whether or not the hydrocephalus is the result of an active meningitis or if it is due to obstruction between the ventricles and subarachnoid spaces. Information regarding the first point can be obtained from an examination of the cerebrospinal fluid. The fluid obtained by lumbar puncture may be clear, whereas that obtained from the ventricles may contain an excess of cells or may even be definitely purulent. Both ventricular and lumbar puncture should usually be done. This is easily accomplished in the case of infants. Information as to the communication between the ventricles and the subarachnoid spaces is obtained by observing whether or not there is a free flow of fluid on lumbar puncture, and if the fluids in the ventricles and in the subarachnoid spaces are under the same degree of pressure; further, whether pressure on the fontanel causes a distinct increase in the flow of fluid from the lumbar puncture needle.

In the case of active meningitis due to the meningococcus appropriate serum treatment should be instituted, and it is well to note in this connection that in the case of infants with meningococcus meningitis it is advantageous to administer serum into the ventricles as well as into the spinal subarachnoid space. In syphilitic meningitis appropriate antisiphilitic treatment should be instituted. In the so-called "acute hydrocephalus" of tuberculous meningitis treatment is at best palliative and should consist in frequent lumbar punctures.

When hydrocephalus is of the "communicating type," *i.e.*, when there is free communication between the ventricles and the subarachnoid, diuretin should be administered, and usually this treatment leads to good results. When hydrocephalus is of the non-communicative type surgical procedures are indicated.

C. A. Stewart, M.D.

BLOOD PLATELET COUNTS IN INFANTS AND IN YOUNG CHILDREN: John P. Caffey, M.D., and Stafford McLean, M.D. (Amer. Jour. of Diseases of Children, December, 1925). Dyke states that there can be no doubt that the platelets are entities, and that the proof is now complete of their relationship to the hemorrhagic diathesis and to the production of purpura. Duke has shown that when the platelet count falls below 60,000 per cubic millimeter there is an abnormal tendency to bleed; that when it falls below 10,000 hemorrhage becomes severe and when below 1,000, fulminant. Two main factors concerned in the production of hemorrhage are: (1) toxic action on the endothelium of the vessels, and (2) removal of the platelets from the circulation.

Lucas and Fleischner in Abt's "Pediatrics" give the normal for children as 250,000, with variations from 200,000 to 400,000. There is no relationship between the number of red cells or white cells and the platelets. It is notable that the number of platelets in the newborn and the premature infants averaged 278,000 and 246,000 as contrasted with an average of 359,000 and 346,000 in the two older groups of infancy and of early childhood.

A comparison of the hemoglobin percentage with the number of platelets reveals no parallelism, which is also true in a comparison of the red cells with the platelets.

Syphilis may produce a reduction of platelets, perhaps, by a depressed activity of the megakaryocytes due to the action of a syphilitic toxin on these cells, or, perhaps, by an active spirochetosis of the bone marrow.

In fourteen cases of severe anemia in children less than 22 months of age, the average platelet count was 266,000. In these cases, a severe anemia was not accompanied by an abnormal platelet count except in three instances when it was definitely diminished.

In four cases of splenectomy, there was a slight increase in the number of platelets during a long period of observation following the operation.

In three cases of acute lymphatic leukemia, there was a marked reduction in the number of platelets.

Diseases of the Respiratory System.—In ten cases of acute bronchitis. In sixty-nine cases of pneumonia. In sixteen cases of acute suppurative pleurisy.

In four patients with pneumothorax, three of whom had suppurative pleurisy. In six cases of tuberculosis.

In five cases of active infantile scurvy.

In fifteen cases of meningitis. In eight cases of other inflammatory diseases of the central nervous system.

In forty-four cases with various types of acute infection.

In five of seven cases of congenital syphilis.

In twenty-four cases of acute intestinal indigestion, acute intestinal intoxication and acute catarrhal colitis, the platelet counts were all normal.

R. N. Andrews, M.D.

TREATMENT OF PNEUMONIA IN CHILDREN WITH MERCUROCHROME INTRAVENOUSLY: Lewis D. Hoppe and Wm. T. Freeman, M.D. (Jour. of Southern Medical Journal, November, 1925). A full grown rabbit was given 5 mg. of mercurochrome per kilo of body weight intravenously — another rabbit of the same weight was used for control. One hour later both animals were killed and the lungs removed under aseptic precautions. The fluid was expressed from the lungs of both rabbits and collected in separate sterile containers. The separate fluids were inoculated with various strains of organisms and allowed to stand 15 minutes and one hour respectively. The results of these experiments show that following the intravenous or intraperitoneal injection of mercurochrome, the fluids squeezed from the lungs are inhibitory to the growth of bacteria. A sufficient quantity of mercurochrome to make a 1 per cent solution is dissolved in distilled water and filtered. Only freshly prepared solutions should be used and they should not be boiled. The usual dose was 5 mg. per kilo of body weight. A 1 per cent solution is not irritating to the peritoneum and may be safely given. Two to three doses may be repeated in 24-hour intervals.

In the twenty-three control cases the average duration of illness was 16.5 days; while in those receiving mercurochrome the duration of illness was 6.5 days. The twenty-three cases treated with mercurochrome were sick an average of 2.25 days after the first dose was given. The mortality of the control group was 39 per cent, while in those treated with mercurochrome the mortality was 8.5 per cent.

R. N. Andrews, M.D.

GYNECOLOGY AND OBSTETRICS

SUPERVISORS:
ARCHIBALD L. McDONALD,
FIDELITY BLDG., DULUTH
L. W. BARRY,
LOWRY BLDG., ST. PAUL

CHRONIC PELVIC INFECTIONS: Arthur H. Curtis (Surg., Gyn. & Obstetrics, January, 1926, Vol. XLII, No. 1). The author presents certain deductions drawn from combined clinical and laboratory experience.

1. Concerning Chronic Leucorrhea: This arises chiefly from the cervix and from glandular pockets about the urethra. It has also been found that thirty per cent of the patients with chronic purulent leucorrhea are carriers of virulent streptococci. This means that about one in three women with chronic discharge is liable to spontaneous postpartum infection, especially if there have been lacerations of the cervix. Also vaginal operations on such patients are accompanied by more than the usual risk of infection.

2. The Endometrium: Microscopic and bacteriologic studies indicate that chronic infection of the endometrium is quite unusual. Supra-vaginal removal of the chronically diseased uterus is a clean procedure, and treatment of the stump with iodine or cautery is ordinarily superfluous. Similar studies of the endometrium from uteri removed a few days following curettage or packing, proved that many of these showed bacteriologic and histologic evidence of infection. Extensive intra-uterine instrumentation introduces the possibility of a temporary acute endometritis. This is supported by clinical experience, after hysterectomy in these cases and after criminal abortion. Here it is found that the clean uterus may be entered with impunity, but a second invasion stirs up the bacteria previously introduced and results in active infection. High morbidity or mortality after abortion is almost pathognomonic of repeated invasion of the uterus or accidental perforation.

3. The Fallopian Tubes: The gonococcus attacks the tube from within, while the streptococcus infection of the tube is only a part of widespread pelvic infection.

4. a. Gonorrheal Infections: Microscopic and bacteriologic studies of the tubes indicate that the tissues are usually sterile two weeks after fever and leucocytosis has subsided. It is considered that recurrence of salpingitis is really reinfection rather than chronic local infection. This may represent a new infection from without or ascending infection from traumatism of a chronically infected cervix.

b. Streptococcus Infection: Similar studies indicate that the bacteria persist in the tissues for a much longer period (six months to two years). Surgery is done only for complications or sequelæ and should be postponed for at least six months to allow the infection to subside. A more radical attitude is taken towards the ovaries because there is considerable danger of reinfection.

Conclusions: 1. Operation by the vaginal route upon patients with chronic purulent leucorrhea introduces an increased risk of post-operative streptococcic pelvic peritonitis. 2. The endometrium of the body of the uterus is nearly always free from bacteria. Supravaginal hysterectomy is, therefore, ordinarily a clean procedure. 3. Mild infection of the endometrium is relatively frequent after diagnostic curettage. Hysterectomy should preferably be performed at the time of the curettage or postponed until the subsidence of the inflammatory reaction. 4. Operations upon Fallopian tubes for eradication of gonorrheal infection are not often indicated, because the infection tends to disappear if the patient is protected from reinfection. Surgery should be delayed and reserved chiefly for sequelæ, such as adhesions, menstrual disturbance, and sterility.

A. L. McDONALD, M.D.

THE BELL-BEUTTNER OPERATION WITH OVARIAN CONSERVATION OR GRAFTING: W. Blair Bell (Surg., Gyn. & Obstetrics, Jan., 1926, Vol. XLII, No. 1). The author discusses the more essential points concerning the indications and technic of this operation. He particularly emphasizes the importance of a proper selection of cases. The Bell-Beuttner operation is particularly indicated for those inflammatory lesions which cause irreparable damage to the Fallopian tubes, possibly to the ovaries, and affect the fundus of the uterus, but less severely. This is most often the gonococcus infection and it must have reached the chronic stage before being treated surgically. It is usually advisable to amputate or treat the cervix uteri, especially when there are lacerations.

Lesions of the fundus uteri due to infection cause menorrhagia. The other symptoms are those of chronic salpingitis, ill-health, abdominal pain, dysmenorrhea, etc. In the absence of menorrhagia the fundus is rarely involved, and simple salpingectomy including the interstitial portion is sufficient. In more severe cases, or in those approaching the menopause, hysterectomy with removal of the adnexa is advisable. The operation in question then is reserved for a limited group of cases with irreparable lesions of the tubes and ovaries and definite infection of the fundus uteri. The author does not leave the ovary in the pelvis if there is any question concerning its blood supply. If the woman is under forty years of age ovarian graft is advised if both ovaries have been removed from their normal connections. The technic of the operation is described in detail and is well illustrated. The ligaments are ligated before being divided, so the operation is practically bloodless. If one ovary is to be conserved the corresponding tube is removed, leaving the meso-salpinx and ligating the bleeding vessels subsequently. On the anterior surface of the uterus a flap of peritoneum with the bladder is reflected, and, after closing the uterus and controlling bleeding, this flap is sutured over on the posterior surface covering the pedicles and all raw surface.

A. L. McDONALD, M.D.

BOOK REVIEWS

BOOKS RECEIVED FOR REVIEW

EARS AND THE MAN: STUDIES IN SOCIAL WORK FOR THE DEAFENED. Annetta W. Peck, Estelle E. Samuelson and Ann Lehmann, New York League for the Hard of Hearing. Introduction by Wendell C. Phillips, M.D. 217 pages. Cloth, $2.00. Philadelphia: F. A. Davis Company, 1926.

THE PRINCIPLES AND PRACTICE OF ENDOCRINE MEDICINE. William Nathaniel Berkeley, Ph.D., M.D. 368 pages. Cloth, $4.50. Illus. Philadelphia and New York: Lea and Febiger, 1926.

MODERN MEDICINE. Its Theory and Practice. Edited by Sir William Osler, Bart., M.D., F.R.S. Third Edition, re-edited by Thomas McCrae, M.D., assisted by Elmer H. Funk, M.D. Vol. II. 891 pages. Illus. Cloth, $9.00. Philadelphia and New York: Lea and Febiger, 1925.

PSYCHOLOGICAL HEALING. Pierre Janet. Translated from the French by Eden and Cedar Paul. Vols. 1 and 2. 1,265 pages. New York: MacMillan Company, 1925.

SUBMUCOUS ENDOCAPSULAR TONSIL ENUCLEATIONS. Clinics of Charles C. Miller, M.D. 218 pages. Illus. Chicago: Oak Press, 1925.

A brief description of the details of this operation is as follows:

Crypts of tonsils are thoroughly sterilized, after which injections of novocaine are made into the substance of the tonsil itself, but not into the peritonsillar region. With a sharp knife an incision is made into but not beyond mucous membrane, vertically, bisecting the tonsil surface. The mucous membrane is then dissected away from tonsil both backward and forward, leaving two membrane flaps, which are left as a protective barrier. The tonsil mass is then grasped and dissected out by means of a punch, being careful not to include basal membrane or capsule. Any small remnants are easily seen and eliminated by use of the punch. Lymphoid masses at base of tongue are removed by curved tonsil scissors or any angular punch.

Some of the advantages of this technic for tonsillectomy are given as follows: (1) the base membrane and peritonsillar connective tissue are left as a protective against infection. (2) Trauma or exposure of pharyngeal musculature is avoided. (3) The pericapsular blood vessels are not divided, eliminating ligation or other hemostatic measures because of cutting the larger blood vessels. (4) Avoids cicatrization and resulting sore throat and lowered resistance. (5) Prevents atrophy of pillars. (6) Prevents change in singing or speaking voice by perfect use of soft palate.

This book describes in detail the treatment of peritonsillar abscess, also the complications of infection in the tonsils. It is well written and illustrated. There are several objections to both the author's reasoning and technic which will readily come to mind on its reading, and the book is recommended for an evening's perusal as a radical departure from well established channels of procedure.

K. C. WOLD, M.D.

WANTED—Salaried appointments for Class A physicians in all branches of the medical profession. Let us put you in touch with the best man for your opening. Our nation-wide connections enable us to give superior service. Aznoe's National Physicians' Exchange, 30 North Michigan Ave., Chicago. Established 1896. Member The Chicago Association of Commerce.

PHYSICIAN, 33, well trained in Gynecology, some Surgery, graduated from Germany, U. S. A. license, good manners, wants to associate with elder colleague, preferably surgeon, or to buy a city practice after introduction. Speaks German, Spanish and French. Address C-66, care MINNESOTA MEDICINE.

POSITION WANTED—Laboratory technician, young woman, three years New York hospital experience. Can do blood chemistry, chemical pathology and bacteriology or assist otherwise in doctor's office. Write Miss E. Waxman, 5105 Colfax Avenue South, Minneapolis, Minn.

FOR SALE—Wappler E-Xell diathermy and large rotary converter, used four months. Reason for selling, formed partnership duplicating this machine. Can buy one or both. Address C-71, care MINNESOTA MEDICINE.

WANTED—Well qualified eye, ear, nose and throat man, good refractionist and operator, wants assistantship or location. Gentile, Protestant, excellent references. Address C-68, care MINNESOTA MEDICINE.

WANTED—Physician who wants to associate himself with dentist. Fine location, new building, Minneapolis. No other physician on the avenue. Telephone Hy. 0262. After office hours, Col. 4247.

FOR SALE—Haldane Basal Metabolism Apparatus, three unit, complete with tank and electric motor, in excellent condition. Price $125.00. Address C-65, care MINNESOTA MEDICINE.

OFFICE SPACE to let in a new downtown building with a group of physicians. Will give free rent to right party until established. Address C-75, care MINNESOTA MEDICINE.

WANTED—Assistant in general practice in a town near Twin Cities; one whose inclination is toward internal medicine. Answer "R", care MINNESOTA MEDICINE.

EXCELLENT OPENING—For physician in West Central Minnesota town. For further information address Sam Evander, Underwood, Minn.

WANTED—A Pediatrician and an Aurist and Oculist to be associated in a Minneapolis Clinic. Address XYZ, care MINNESOTA MEDICINE.

LOCUM TENENS—Prefer a man who has just completed internship April 15 to July 10. Address C-76, care MINNESOTA MEDICINE.